Vol. XLVI AUGUST 3rd, 1944

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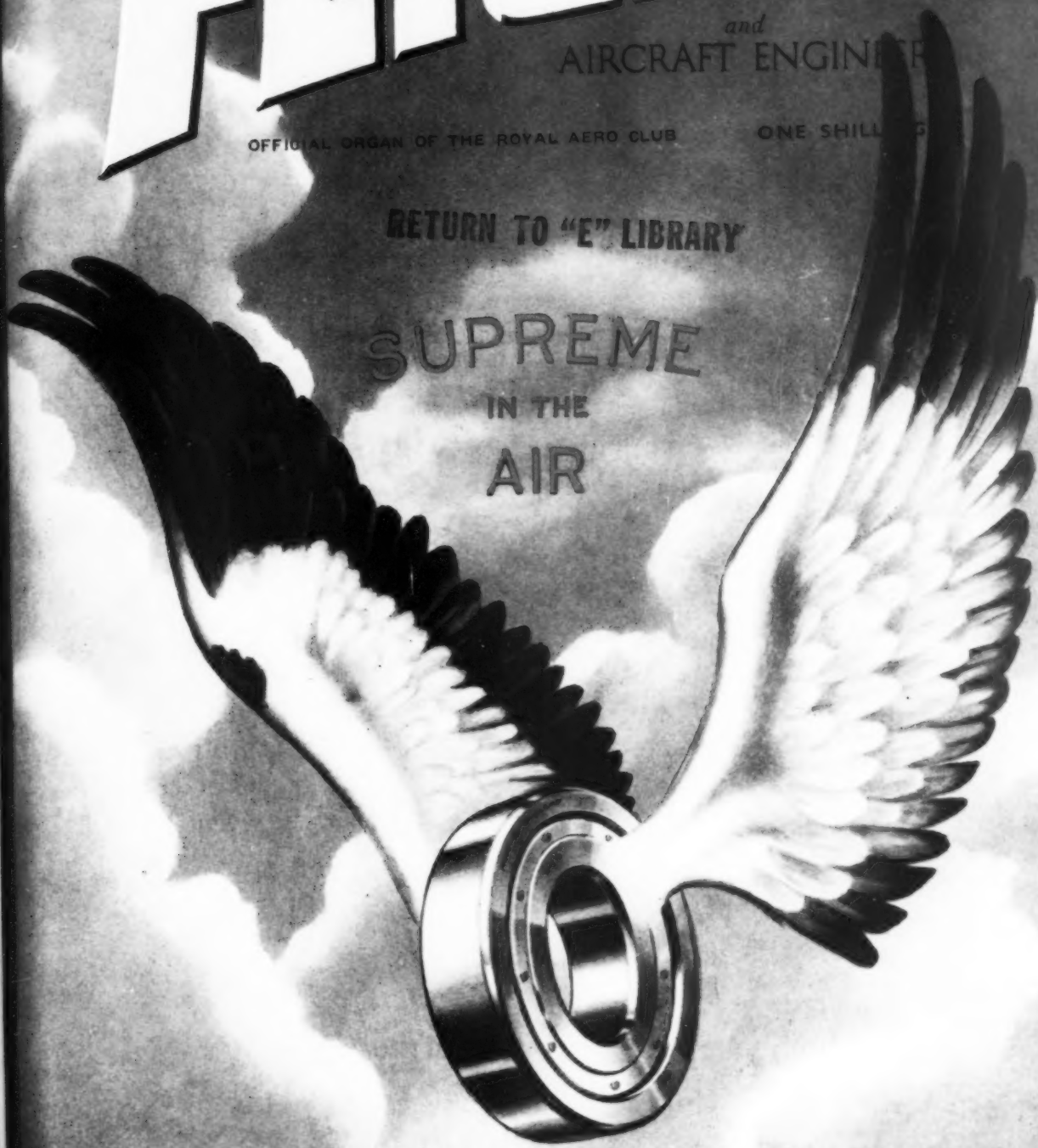

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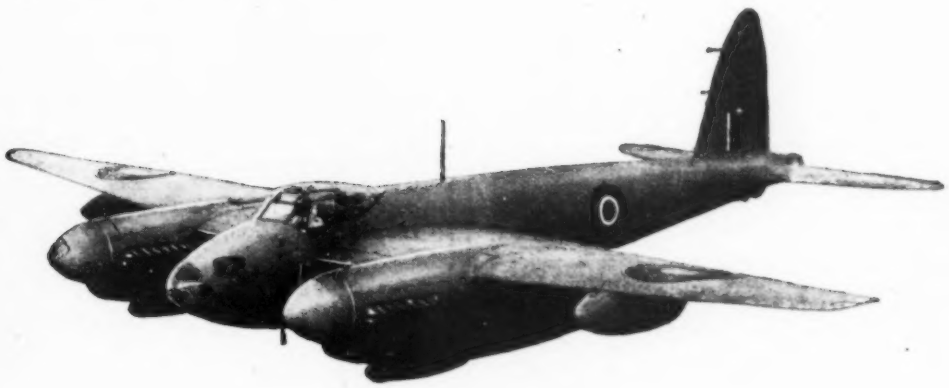

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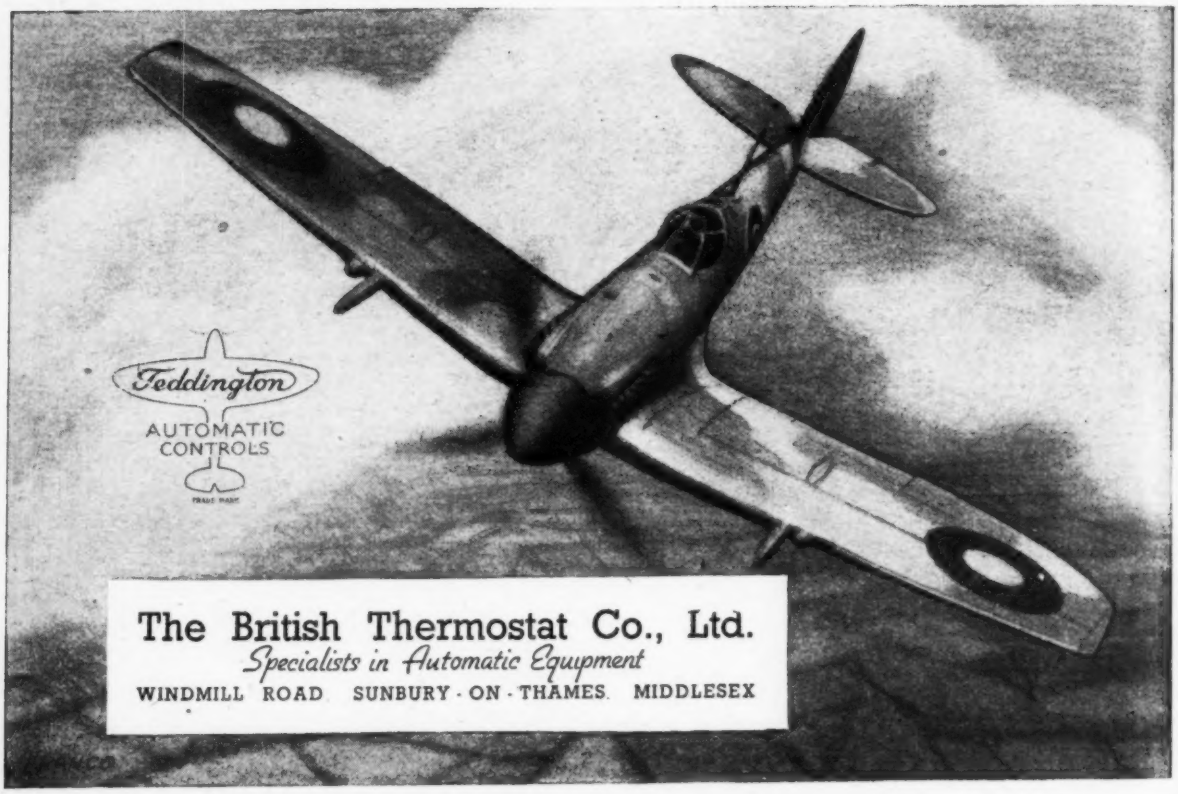

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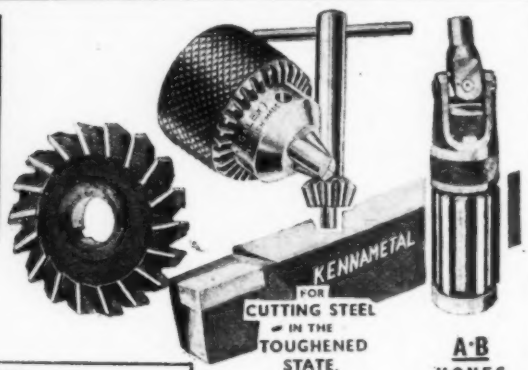

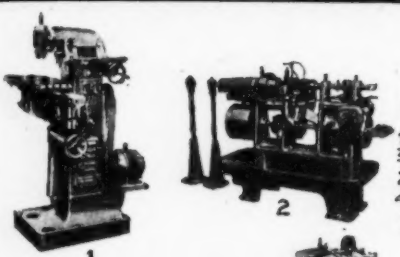

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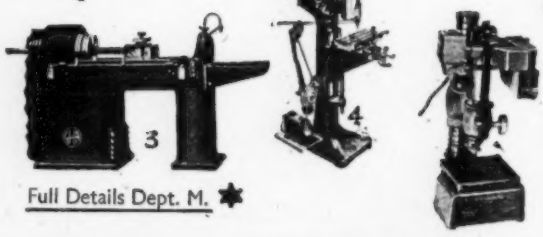

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The Outlook

While the Iron is Hot

THERE was never very much probability that a collapse of the *morale* of German civilians would have any effect in shortening the war. After the Armistice of 1918 German propagandists were anxious to make out that such a collapse (they called it "a stab in the back") was the main cause of the German defeat; whereas the fact was that the German Army was beaten in the field. The rank and file were still game to fight on and to fight bravely; but Hindenburg and Ludendorff insisted that Germany should sue for terms.

In the present war, German civilians have suffered from the Allied air offensive in a way which was unknown in 1918, and that despite the fact that the Allies never struck deliberately at the civilians, but only at war production. Himmler and the Gestapo are in a position to see to it that the desire of the civilians for peace cannot affect the policy of Hitler's Government. Some Generals tried, but they failed.

Nevertheless, Dr. Göbbels has never shown himself indifferent to the desirability of keeping civilian *morale* as cheerful as possible. So long as the German Army was winning victories, this was an easy task. *Flight* has always expressed the belief that civilian miseries in the *Reich* would never depress *morale* until the Army began to suffer defeats.

That time has now come. It remains true that the depression by itself is not likely to produce a clamour for unconditional surrender, any more than the revolt of some Generals was, by itself, able to do so. But the two together may have an effect not clearly discernible outside the *Reich*. At a time like this, every little may well tot up to the advantage of the United Nations.

This is obviously the moment for pressing home every advantage—not by deliberately slaughtering civilians (as the Germans do with their air torpedoes) but by displaying our power to go on striking from the air in a way which all civilians can see. It is reported that civilian Germans hoped that when the Second Front opened the Allied Air Forces would be so busy that the offensive against production must slacken off. The series of heavy attacks on Kiel, Stuttgart, oil installations and refineries, and on tank factories, have effectually quenched any such hopes. Berlin, too, has enjoyed few nights without visits from Mosquitoes, with their 4,000 lb. bombs. Göbbels has now a hard task to persuade Germans that their victory is assured.

The Rocket-firing Typhoon

THE battle raging in Normandy as we write is a typical Montgomery battle. Perhaps this fact was somewhat obscured by the allocation of the western sector to the Americans and the sector round Caen to the British and Canadians. The two nationalities are not intermingled, as they were in the Sicily campaign and as they still are in the 5th Army in Italy. But, none the less, all the Army formations are under General Montgomery.

As on so many previous occasions, Sir Bernard has induced the enemy to mass in front of one of his flanks and then has struck with irresistible force on the other. The 2nd Army encountered a position south of Caen so strongly held with anti-tank guns, dug-in tanks and large numbers of mortars, that the fighting there became almost static for several days. Evidently Rommel had once more done what Montgomery had willed him to do.

Thereupon General Bradley's American force to the west struck with the greatest determination and dash in the sector round St. Lo, and straightway broke through the German defences.

The fighting on the 2nd Army front was not, however, devoid of interest and importance. Pressure on the enemy had to be maintained and his counter-attacks repulsed. This was obviously of prime importance to the Montgomery plan. In this tough fighting a tactical weapon has come into prominence, namely, the rocket-firing Typhoon. It is not exactly a new weapon, but in no previous battle has it played so conspicuous a part. When the 2nd Army found that its armour could not advance against the German anti-tank guns and dug-in tanks it fell back on its rocket-firing Typhoons. They did not, it is true, break up the German defence position straight away, but what the Typhoons certainly did accomplish was to break up a congregation of some 40 German tanks which were mustering in a wood for a counter-attack—a very important service.

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Civil Aviation

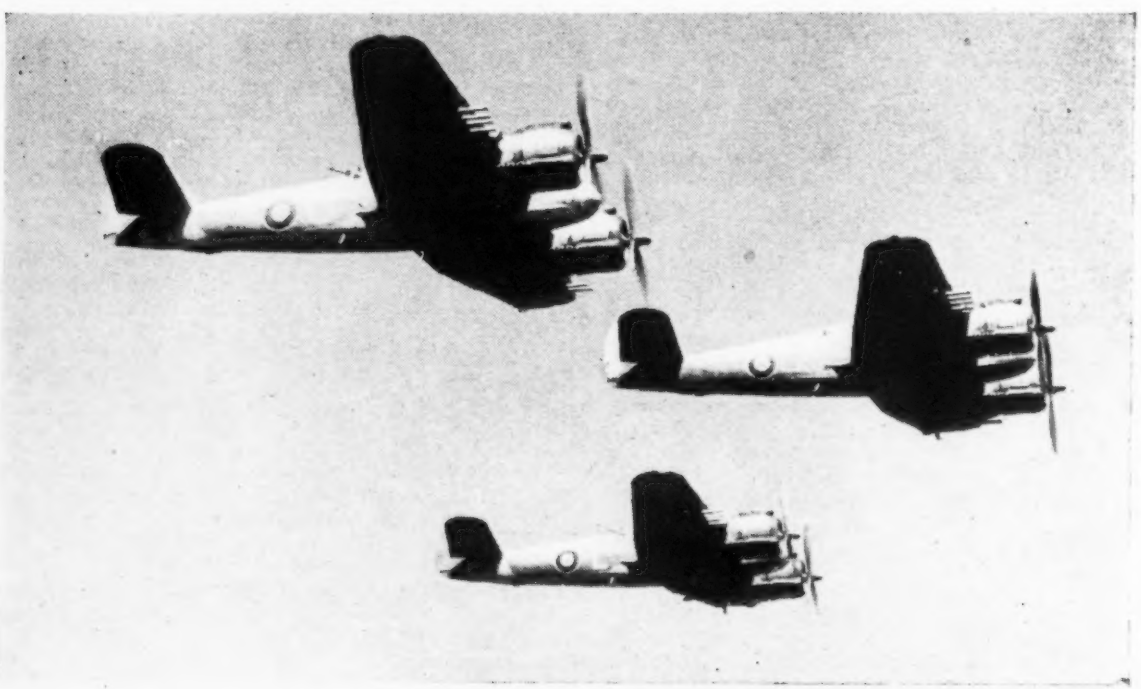
BULLETIN No. 6 of the Tory Reform Committee, issued last week-end, deals with British air transport policy. It does little more than reiterate the arguments in favour of taking civil aviation away from the Air Ministry, placing it under the peacetime version of the present Ministry of War Transport, if such there be, or else under the Board of Trade should shipping revert to that control; of creating a British equivalent to the American Civil Aeronautics Board; of not limiting air transport to one "chosen instrument; and of getting on at once with the production of civil aircraft.

We do not favour the handing-over of civil aviation to the Board of Trade in the event of the Ministry of War Transport reverting to its pre-war title and functions. There does not appear to be any very logical reason for such a step merely on the grounds that shipping goes back to the Board of Trade.

As for the report's suggestion that the U.S. Civil Aeronautics Board be taken as a pattern for a body to grant authority for route operation, we hesitate to believe that the Committee has never heard of our own Air Registration Board. That, surely, is the logical nucleus for the post-war years. It should merely be necessary to extend its scope and strengthen its personnel.

The Tory Reform Committee appears to be satisfied that all has been done that can be done in the international field at the present time. The report uses the phrase: "The situation therefore with regard to the international aspect appears to be in hand." That seems to be a little optimistic, and one is inclined to ask "in whose hands?"

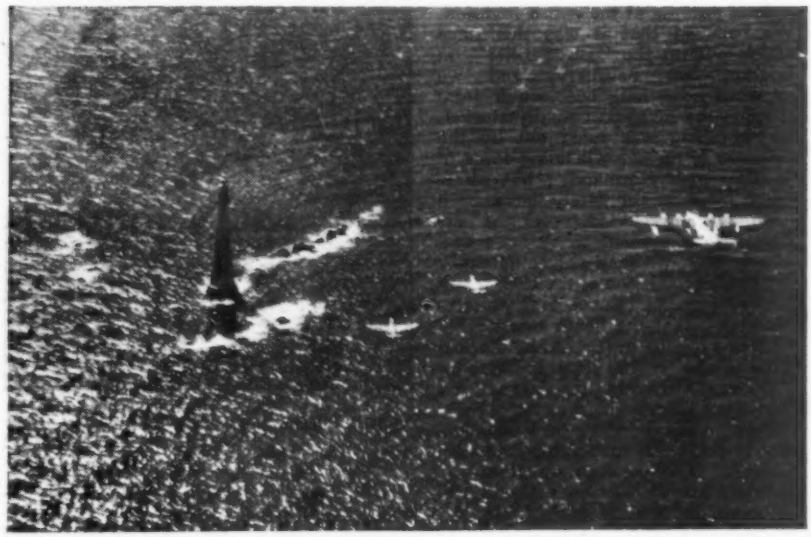
In this connection we would recommend readers to study two articles in this issue. One is by Dr. Edward P. Warner, the well-known American authority, and the other is an interview with the Inspector of the Czechoslovak Air Force, Air Vice-Marshal Janousek.



ARMED RECONNAISSANCE: Rocket carrying Beaufighters of the Mediterranean Allied Coastal Air Force operating over the Western Mediterranean.

WAR in the AIR

Normandy and Rain : Luftwaffe's Appearances : Tank Factories Bombed : Sumatra's Naval Base Attacked



ANTI-U-BOAT : A Spitfire-escorted Sunderland, on its way out on a submarine patrol, passes the Eddystone lighthouse.

THE period of torrential rain in Normandy gave Rommel a chance to move up reinforcements to the south of Caen, so that when the British and Canadians of the 2nd Army tried to advance they were met by very strong defences, and the infantry could only make slow progress, suffering casualties as they advanced.

A tactical weapon on which the Army has come to rely a great deal in such circumstances is the rocket-firing Typhoon. These were called upon to try and clear the way, and they attacked with all the traditional elan of the R.A.F., but they did not meet with immediate success. The German defence position remained solid for a few more days.

The rain had probably prevented our reconnaissance machines from discovering the movements of tanks and anti-tank guns up to the German position. This concentration must have cost a tremendous effort, and we can picture for ourselves how the roads must have been choked. It may well have resulted in convoys of air torpedoes failing to get through from the store caves to the launching platforms, for a period of noticeably reduced activity on their part ensued. Bad weather usually means that more of the bombs which are despatched are shot down en route and fail to arrive at an area where they can do damage. But if the supplies at the launching bases begin to run short and cannot be replenished because the roads are choked with Army reinforcements, the result must be that fewer of the missiles are sent on their way. So bad weather may also restrict their activities.

The rain had another effect. An R.A.F. officer observer remarked that the German runways were "probably much worse than ours, for no Hun fighters—which usually take every advantage of low cloud for hit-and-run tactics—have shown up over the Normandy battle area for two days during daylight." This remark is illuminating, for most observers have represented the fighter section of the *Luftwaffe* as playing no part at all in the battle. Tip-and-run tactics, however, cannot have more than a nuisance value, and certainly do not represent an attempt to gain control of the air. Striking at ground troops, or at airstrips, is only a secondary function of fighters. If they cannot and will not attempt to grapple with opposing fighters, they are in fact a beaten force, and by their actions they show that they admit that fact.

P.M.'s A.O.P. : Mr. Churchill in the Fieseler 156k Storch which he used during his recent visit to Normandy.

German Bombers

LUFTWAFFE bombers have, once at least, shown a little more enterprise. One night last week they made a sharp raid on the Caen area, and kept our night-fighters and A.A. guns in action for a long period. There was nothing like concentration or saturation about their tactics; in fact, their object probably was to spin things out and keep our men on the *qui vive* for as long a time as possible during the night. Still, this was not a very impressive effort. We had been led to believe that the

WAR IN THE AIR

Germans had kept in reserve a sizeable force of bombers for the special purpose of striking at the Allied invasion. We believed that it was this force which put up the "Little Blitz" on London last February, and we expected something spectacular from it when the invasion actually started. Day-bombing was ruled out by the presence of an overwhelming force of Spitfires over Normandy; but something more might surely have been done by night! However, if the *Luftwaffe* is content to sit back and take it easy, we shall not complain.

The Chief Surgeon of the U.S. Army in the European Theatre of Operations has stated that the death rate among wounded treated in U.S. Army medical units in the combat zone is less than 3 per cent.—a very low figure! He attributed this excellent result to early surgery, the immediate use of whole blood, penicillin and sulphonamides, and the rapid evacuation from the battle front. In this evacuation a useful part has been played by aircraft. Of course it would not be possible to evacuate the majority of the wounded by air; but the most urgent cases are sent that way, and without the use of air ambulances it is probable that the percentage of deaths would be higher.

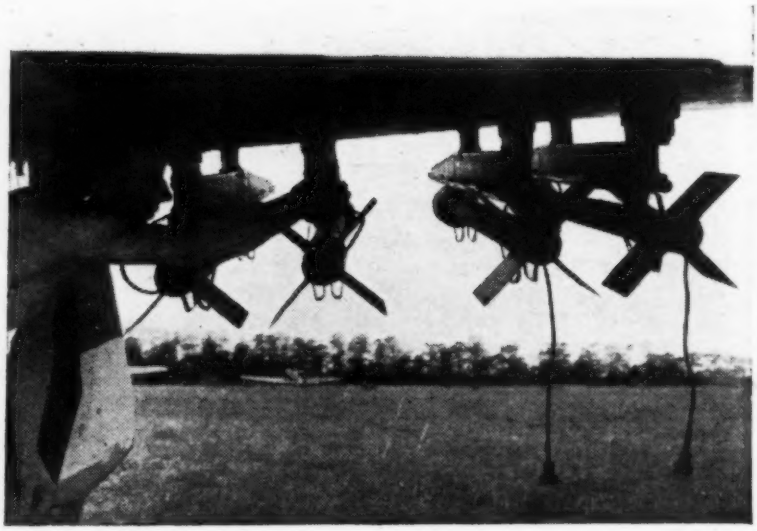
Attacks on German oil supplies have continued, but lately the Mediterranean Allied Air Force has been adding to its raids on oil a number of attacks on factories which make tanks. One correspondent in Italy has even suggested that the enemy tank industry has begun to supersede oil plants as a target. Signs have been noticed that the Germans in Normandy have been getting short of oil; but nevertheless Rommel has made good use of his tanks in holding positions, and he has contrived to move them to the areas where he wanted them. Tanks, like aircraft, are best destroyed in their nests. They certainly deserve a share of the attentions of the Allied bombers.

In addition, Kiel, Stuttgart and Berlin have been raided. The two former were attacked by heavy bombers, while Berlin received a whole series of raids by Mosquitoes.

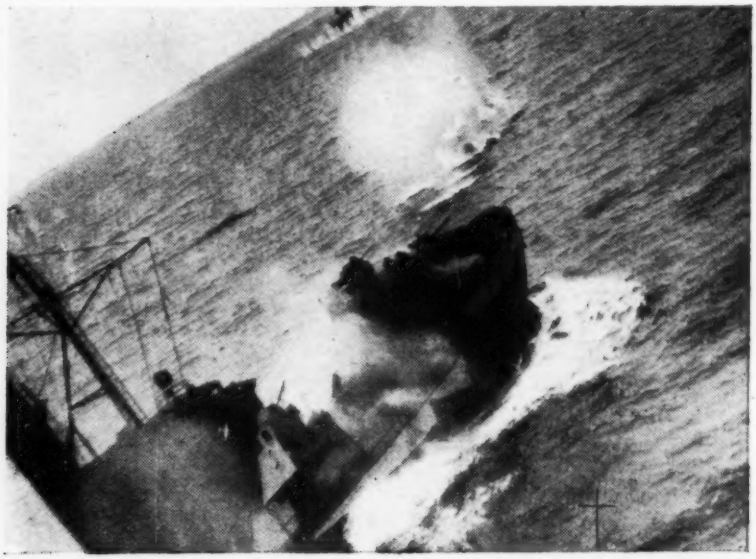
Another concrete structure was discovered at a place called Watten in the Pas de Calais, which may have been a site for what the Germans call V2. We suppose those hieroglyphics to imply rocket shells. British heavy bombers promptly visited it and treated it to a dose of 12,000 lb. bombs. These terrific explosives have great penetrating effect, even on concrete, and it is to be hoped that Watten will give us no more trouble.

Last week a rumour got about that the air torpedoes had been dropping incendiary bombs, but the Ministry of Home Security was able to state that there was no foundation at all for the rumour. When one compares the discomforts of the present robot attack with those of the big blitz of 1940-41, it is as well to remember that, though the present missiles make little distinction between day and night, they have not (so far at least) used either time-bombs or fire-bombs.

The bombing attacks on the launching platforms have certainly reduced the number despatched. It is certain that a high proportion of those which do take to the air get shot down or run into balloon cables. It is also probable, as was pointed out above, that the congestion wrought by the R.A.F. on the roads in France has sometimes prevented convoys of the missiles from finding their way from the stores to the launching platforms. Better weather, if it comes, would undoubtedly mean that still more would be sighted and destroyed in the air.



FOR CLOSE SUPPORT: Fitting the electrical plugs which fire the rocket projectiles on a Typhoon.



CONVOY STRAFE: A German convoy off Norway receiving the attentions of Coastal Command Beaufighters. The tilted horizon appears to indicate that the Beaufighter was banking away when the picture was taken.

Slaughter in Yugoslavia

THE Mediterranean Air Force has recently reported a most gratifying excursion by Spitfires and Mustangs into Yugoslavia. In the Zagreb area they knocked out no fewer than 38 locomotives. Then, scouring over the main line between Nish and Skoplje, they came upon three troop trains so crammed with German troops that soldiers were sitting on the

NEAR MISS: A bomb throws spray over the deck of an Essex class U.S. carrier in the Pacific. The Japanese bomber which dropped the bomb can be seen on the left of the picture with its tail shot off by A A. fire.

WAR IN THE AIR

roofs of the carriages. The fighters first hit the engines and brought the trains to a standstill. Then the Mustangs flew up and down, raking the carriages with their fire. Of course, the troops tried to get clear of the trains and scatter over the open country, but the slaughter must have been considerable.

Admiral Somerville's Eastern Fleet has sallied forth from Ceylon in strength against the Japanese naval base of Sabang in the north-west corner of the great island of Sumatra. This base is almost opposite the loved and lost town of Penang in Malaya, and either place could dominate the northern entrance of the Straits of Malacca. The fleet consisted of battleships, cruisers and destroyers, as well as the indispensable aircraft carriers. The Japanese were taken completely by surprise, and for half an hour the ships and aircraft battered the harbour installations and the shipping in the port. The barracks were hit by ten heavy salvoes, and the Radar station was both shelled and attacked from the air. Only two British personnel were killed. One aircraft came down in the sea, but the pilot was rescued.

The Japanese first showed the value of aircraft and carriers in the Pacific war; but the Allies are showing that they now fully appreciate it. There is now a tendency to hold that carrier-borne aircraft can hold their own against shore-based machines, unless the latter have a great advantage in numbers.

MIDSUMMER NIGHTMARE: Canadian ground crews have to provide temporary cover from the rain while working on a Seafire in Normandy. The weather in France has been consistently bad ever since the invasion.

Redivivus

IT is interesting to read of the old Stirling heavy bomber making a reappearance. It has lately been used for bombing the sites of the missiles which the Germans call V1 and (perhaps) V2. This does not imply that Bomber Command is short of heavy bombers. The recent decision to transfer men from the R.A.F. to the Army proves that there is no shortage. But it is an economy to use a type of machine for a task which it can perform quite satisfactorily when otherwise it might just moulder in a hangar, while more recently produced types are employed on work for which they are specially suited.

Progress is constantly being made in developing the methods by which the 2nd Tactical Air Force brings help to the ground troops when they are in difficulties. Demands for air help no longer go up to the H.Q. of a corps or army, but there is now what is called a Visual Control Post on the battlefield by which air support can be brought up with a minimum of delay—often of only a few minutes.

HERE AND THERE

CROWDED OUT: A U.S. aircraft carrier, pressed into service as a transport during the accelerated pressure on Japan, had to pack all her "cats" on the flight deck because all space below was filled with motor vehicles and supplies.

Sub-contracted

PARTS for the Packard-built Merlin engine are now being manufactured by the Ranger Aircraft Engine Division of the Fairchild Corporation.

Spanish Rights for U.S.

THE United States has reached agreement in principle with the Spanish Government under which American commercial aircraft will be granted landing rights in Spain.

Jet Aircraft in Production

IN a written reply to Mr. Granville (Ind., Eye) last week, Sir Stafford Cripps, Minister of Aircraft Production, stated that jet-propelled aircraft are now being produced under the direction of M.A.P.

U.S. Experts Study Robot Parts

"PARTS of several robot bombs which have fallen in Southern England have been assembled and are being closely studied here," stated officers of the U.S. Army Air Force Material Command at Dayton, Ohio.

R.A.F. Bombers' Bag

THE recent Air Ministry announcement that, during the month of June, R.A.F. bombers shot down 109 German fighters was a welcome item of official news. It should do something to dispel the idea, incurred by official reticence on the subject, that only American bombers—notably the Fortress—can deal effectively with fighter opposition.

B.O.A. in South America?

OUR contemporary, *American Aviation* says that British Overseas Airways Corporation is preparing to start a regular service between Rio de Janeiro and Buenos Aires, and adds that the inauguration of the service is merely awaiting the British Government's "go ahead" signal.

W.A.A.F.s Arrive in Cyprus

ANOTHER small contingent of the W.A.A.F. from Britain arrived in Cyprus recently, and was welcomed at the hostel by a Cypriot "Waaf" recruited earlier this year.

An R.A.F. recruiting officer recently arrived on the island to enlist Cypriots for ground staff crews, and applications are already flowing in.

Kangaroo

A CURTISS COMMANDO has carried a Sikorsky YR-4B army helicopter to a northern airfield where it was required for cold weather tests.

The helicopter was, of course, dismantled for stowage, the cabin section complete with engine being detached from the rest of the fuselage. The latter proved the most awkward piece to tuck in.

To Aid Scientific Research

EIGHTY Fellowships in scientific research, having an average value of £600 per annum, are being offered to nine selected universities in Great Britain by I.C.I.

The proposed allocations are:—Oxford, Cambridge and London, 12 each; Glasgow, Edinburgh, Liverpool, Manchester and Birmingham, eight each; and four to Durham University.

Up-to-the-Minute

"AVIATION-MINDED Wayne University in Detroit," says *National Aeronautics*, "stole a march last month on the rest of the nation's colleges with the announcement that it will offer a course in jet-propulsion at the next term in September."

The course is to be given under the direction of Mr. Arthur A. Locke, head of the aeronautics engineering department at the university, which has been gathering material on the subject since May, 1943.

GLOBAL TOUR: Mr. A. C. Campbell Orde (left), assistant to Lord Knollys, snapped with Mr. Erik Nelson, manager of the North Atlantic Return Ferry Service, at Vancouver, during his tour of B.O.A.C. routes, U.S. aircraft plants, and Canadian airlines.

Death of Airways M.O.

COLONEL FREDERIC PERCIVAL MACKIE, of Mark, Somerset, whose death at the age of 69 is announced, was formerly an honorary surgeon to the King. He joined Imperial Airways as medical adviser in 1937 and, with a colleague, effected a method of destroying mosquitoes in aircraft. He was also chief medical officer to B.O.A.C.

Col. Mackie served 29 years in the Indian Medical Service, and was on the Younghusband expedition to Tibet.

R.C.A.F. Mission for Pacific

AIR VICE-MARSHAL L. F. STEVENSON, Commodore of the R.C.A.F. Pacific Coast Defences, is leading a party of R.C.A.F. officers to the Pacific war theatre "to acquire information which would be of use to the R.C.A.F. should

HERE AND THERE

it be called upon to operate under climatic conditions with which it is unfamiliar," says an Air Force H.Q. announcement from Ottawa.

The party will report to the R.A.F. H.Q. in South-east Asia.

It is learned from well-informed sources that one purpose of the mission will be to make preparations for the establishment of Canadian squadrons in that area, and also possibly to make arrangements for the flow to the Pacific of trainees from the Commonwealth air training plan.

U.S. Air Commission in Madrid

A U.S. Civil Aviation Commission recently arrived in Madrid to begin negotiations for the establishment of a commercial air service between Spain and the United States.

Members of the Commission are Mr. Charles Stanton, U.S. Civil Aeronautics Administrator, Mr. Fred Novinger and Mr. Oswald Roan.

R.A.F.V.R. Aircrew Club

RECENT correspondence in *Flight* has created considerable interest in the Royal Air Force Volunteer Reserve Aircrew Club. Membership of this club is open to all those on deferred service for aircrew and those who have subsequently entered the R.A.F. as aircrew.

Full information can be obtained from the Hon. Sec., Technical Staff Mess, R.A.E., Farnborough, Hampshire.

Flying "Frig"

THE Glenn Martin concern has developed a method by which the preliminary freezing of perishable goods for transport by air will be eliminated. The idea is that the aircraft climbs to freezing altitude and forward hatches are opened to admit the air to circulate through the perishable cargo.

But there may be no truth in the rumour that the method was suggested by the waist gunners of an earlier type of American bomber, produced by a rival company.

Tell it to D.H.

OUR paragraph announcing that De Havilland's were inviting suggestions for a name for their forthcoming civil air-liner, and offering a small prize to the sender of the one ultimately adopted, has resulted in a number of readers sending in their suggestions to *Flight*.

We have forwarded these on to the De Havilland Aircraft Co., Ltd., Hatfield, Herts, but other aspirants for the honour of naming the new D.H. aircraft (not to mention getting the prize!) should send their inspirations direct to the firm, and not to us.

The "Old Lady"

A TRIBUTE to *Canopus*, the first of the Short Empire flying boats, which is now eight years old, is paid in the July issue of B. O. A.'s *News Letter* on the occasion of her birthday, by Capt. H. W. C. Alger, who has commanded her at intervals throughout her life.

"*Canopus*," he says, is affectionately known as the 'Old Lady' by us all; but old as she is, her performance is equal to, if not better than, the rest of the fleet—she is as fit for flying as the day she was launched."

Having seen service on the Australia, Singapore and other Empire routes, this veteran flying boat has piled up approximately 11,000 flying hours and covered nearly 1,500,000 miles.

Flt. Lt. P. M. C. Hill, son of Air Marshal Sir Roderick Hill, K.C.B., commanding A.D.G.B., who was killed on a bombing mission in Italy last month. He was 26.

Man of Action

TYPICAL of the dynamic character of Air Comdre. H. M. Probyn, who recently relinquished his post as A.O.C. Cranwell, where he was affectionately known as "Daddy" Probyn, is the story of the occasion when an important R.A.F. chaplain, due to be flown over from a neighbouring airfield to conduct a religious service, was held up by bad weather.

Half an hour before the service was due to begin, a phone message was received that the chaplain could not come, but "Daddy" Probyn did not stop to argue. He jumped into a Tiger Moth, flew through the bad weather, picked up the "grounded" padre, and arrived back at Cranwell with three minutes to spare.

Air Comdre W. E. G. Bryant now succeeds him at Cranwell.

Repairing Crashed Aircraft

AN interesting description of the work carried out by the British motor industry in repairing crashed aircraft was given by Sir Miles Thomas in a speech to Wolverhampton Production Exchange last week.

"In 1940 and 1941," he said, "when we were desperately short of machines, one of the largest motor manufacturing firms was given the task of organising the repairs of crashed aircraft. This meant obtaining the co-operation of literally hundreds of small air charter companies, air-taxi services and the like, and co-ordinating them into a productive whole.

"Speed of organisation was essential, but the project was so successful that very many Spitfires and Hurricanes during the Battle of Britain were actually flown straight off the airfields of those repairing companies back into the battle line, and contributed most usefully to the final results."

Fast Freighter

IN New Guinea, a number of P-40 aircraft have been converted for duty as cargo carriers—and re-designated C-40—by removing the baffle plates from the 110-gallon long-range belly tank and cutting a hatch in the top of it. The tank can then house 660 lb. of spares, medical supplies and mail.

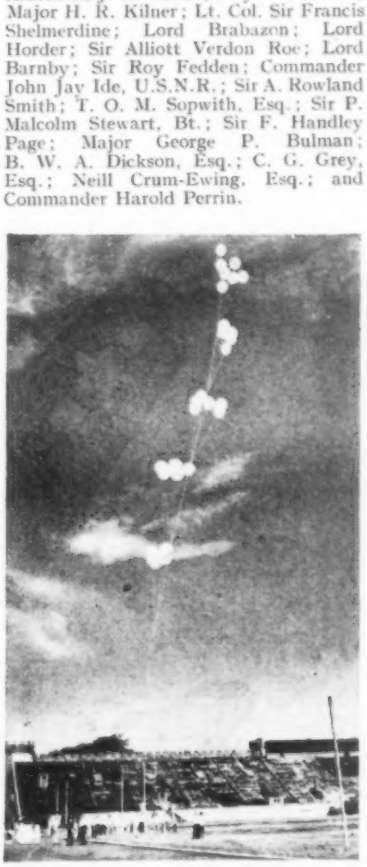
The dodge was first tried out, we understand, in North Africa, but a P-40 Group in Assam is believed to be the first to set aside some of its "C-40s" for regular cargo service.

Fresh meat has also been delivered to U.S. Army outposts on Kiska and Attu, in the Aleutians, by C-40s, which are described as "the fastest cargo planes in the world."

In Honour of Bleriot

A LUNCHEON commemorating the 35th anniversary of the first cross-Channel flight was given by Mr. Alexander Duckham in London last week.

Among the guests were: Col. Corniglion-Molinier and Commandant Blumenthal, representing the French Embassy; Viscount Trenchard; Sir Arthur Whitten Brown; The Marquess of Londonderry; Alderman J. R. Cairns, Mayor of Dover; Major H. R. Kilner; Lt. Col. Sir Francis Shelmerdine; Lord Brabazon; Lord Horder; Sir Alliott Verdon Roe; Lord Barnby; Sir Roy Fedden; Commander John Jay Ide, U.S.N.R.; Sir A. Rowland Smith; T. O. M. Sopwith, Esq.; Sir P. Malcolm Stewart, Bt.; Sir F. Handley Page; Major George P. Bulman; B. W. A. Dickson, Esq.; C. G. Grey, Esq.; Neill Crum-Ewing, Esq.; and Commander Harold Perrin.



Balloons carrying cosmic ray equipment ascending into the stratosphere from Chicago University sports ground. Valuable data was gained in previous ascents to 16 miles.

D

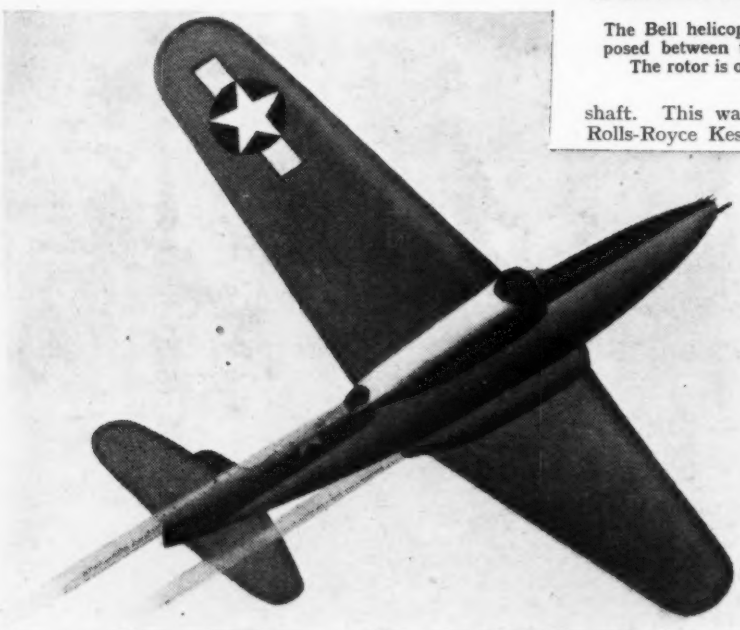
Two Bells

The Bell Aircraft Corporation's Unorthodox Jet-propelled Aircraft and Helicopters : No Combination of the Two —Yet

FROM the time he first founded the Bell Aircraft Corporation, Mr. Laurance Bell has never been afraid of giving the unorthodox a trial. The Bell Airacuda and Airacobra were cases in point. The former had pusher engines and gun positions in the noses of the two nacelles, while the latter, as our readers will well remember, has the single engine mounted in the middle of the fuselage and driving the airscrew through a transmission shaft.

More recently the Bell Aircraft Corporation has been mentioned as being the designers and constructors of the airframe produced in America to take the Whittle jet-propulsion power plant originally sent to America from this country in 1941 and there handed over to the General Electric Company for manufacture and development. In addition, and again with an obvious eye on the future, the Bell Aircraft Corporation has entered the field of helicopter design. All of which is evidence of an adventurous spirit all too rare in the aircraft industry. The nearest parallel in Great Britain is, perhaps, to be found in Westland Aircraft of Yeovil. After starting, during the first world war, by building aircraft to other people's designs, Westlands began original design, and many are the unorthodox types which saw the light of day. It is only necessary to recall here the Woyewodsky and the Hill Pterodactyls, a le Pere Autogiro, and some other strange birds of which little has been heard. Curiously enough, it was the Westland firm which was the first to introduce the engine behind the pilot and the long airscrew transmission shaft. This was in a single-seater biplane fighter with Rolls-Royce Kestrel engine.

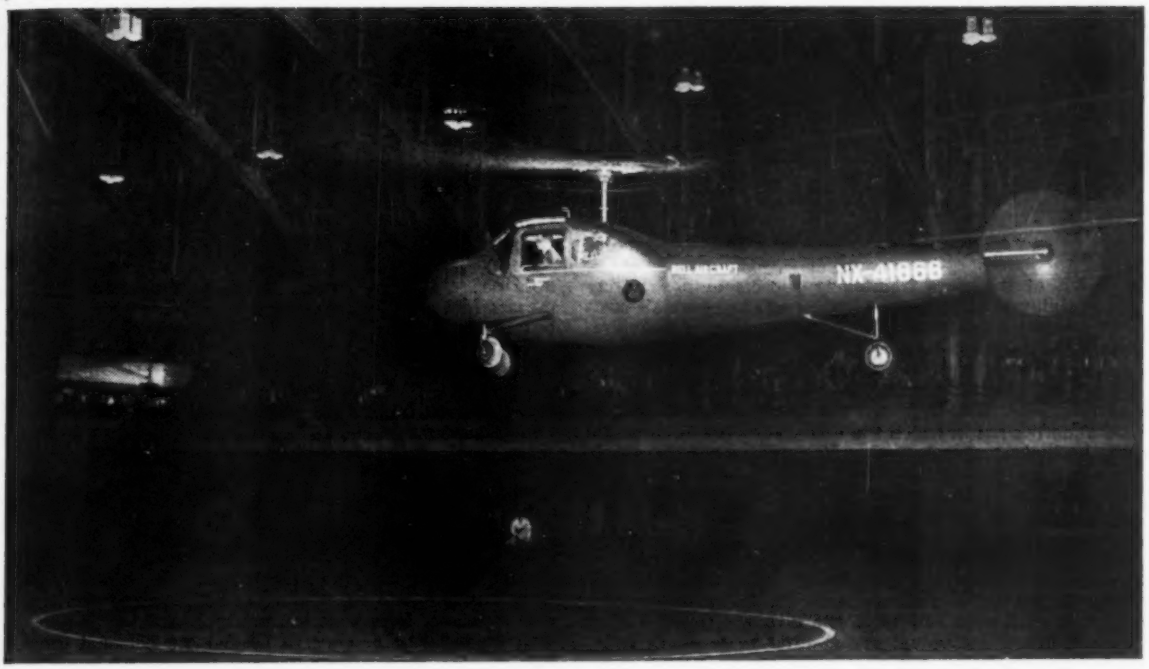
The Bell helicopter is said to have a stabilising device interposed between the rotor hub and the supporting structure. The rotor is of the two-bladed type with wooden blades.



An artist's impression, reproduced from our Chicago contemporary *Air Tech.*, with full acknowledgement, of the Bell jet-propelled aircraft with two Whittle-G.E.C power plants.

However, all this is by the way, but it serves to provide a background for the latest American Bell developments.

Not only keenness but the ability to "get on with the job" was displayed by the Bell Aircraft Corporation when, on September 8th, 1941, it was notified of the proposal that it should design the airframe for the new power plant. Within a fortnight the Bell designers had submitted general-arrangement drawings of the proposed aircraft. The drawings were accepted immediately by the U.S Army Air Forces, and one year and three weeks later, on October 1st, 1942, the first test flight was made by the prototype aircraft. The pilot was Bell's chief test pilot, Robert M. Stanley, and on the following day Brigadier-General Lawrence C. Craigie, of the Army Air Forces, flew the machine, thus becoming the first U.S. Army Air Force officer to pilot a jet-propelled aircraft. The first flight of the Gloster jet-propelled aircraft prototype was made, it will be remembered, by the late Flt. Lt. P. E. G.



Precision flying. The Bell being demonstrated inside a building. The picture is somewhat reminiscent of those published in 1938 when Fräulein Hanna Reitsch flew the Focke-Wulf F.W.61 inside the Deutschlandhalle in Berlin.

Sayer some time during May of 1941.

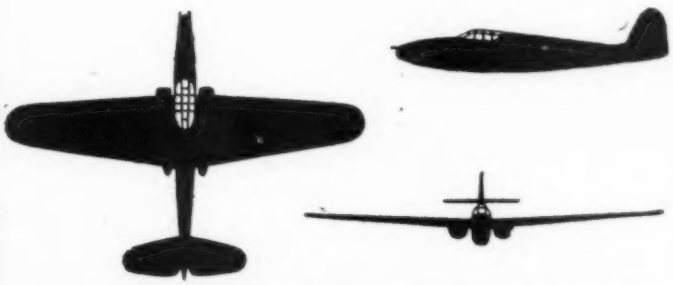
In America, it has been reported, several hundred successful flights have been made on Bell jet-propelled aircraft, and pilots have been somewhat surprised at the unfamiliar simplicity. The absence of vibration and the relative silence of the jet engines behind the pilot combine to make the jet-propelled aircraft uncommonly comfortable to fly, and the absence of airscrew torque renders this type of aircraft comparable, from the handling point of view, with an orthodox type fitted with contra-rotating airscrews.

This front elevation of the Bell jet aircraft, from *Air Tech.*, shows the small ground clearance made possible by the absence of airscrews.

Hitherto the same secrecy has been observed in America about the Bell-Whittle-G.E.C. combination as that applied in this country to the Gloster-Whittle machine. Our Chicago contemporary, *Air Tech*, in its May issue, lifts the veil to some extent by publishing what it terms "exclusive" three-view silhouettes of the Bell. Whether these views are authentic, are "intelligent anticipation," or merely an elaboration of the machine that has been appearing in the Bell Aircraft Corporation's advertisements (in which the entire centre, which would include the power plants, is a plain white circle with the lettering "Censored"), we naturally have no means of knowing. The same journal also publishes an outline front view of the Bell. We reproduce both without accepting any responsibility for their accuracy.

In the design of the new Bell helicopter stability and controllability are said to be the two main factors aimed at. In this aim the Bell does not differ from other helicopters, and as no detailed information has been released, one has few means of knowing to what extent the new machine marks an advance on previous work. It is said to incorporate a stabilising device which isolates the rotor head from the supporting structure and airframe. Pilot and passenger sit side-by-side, and the cabin is entered through car-type doors in the sides. The engine is a 160 h.p. horizontally opposed Franklin, mounted aft of the cabin, with its crankshaft vertical. Cyclic pitch control is used for levelling the lift on the blades, of which there are two, constructed of wood. The rotor diameter is 33ft.

In connection with the jet-propelled aircraft it is significant that the General Electric Company has received a large order from the U.S. Army Air Forces for jet power plants. The company is making available some 600,000 sq ft. of floor space for this production order, a fact which appears to indicate that tests at Wright Field have shown the Whittle-G.E.C. prime mover sufficiently far advanced for quantity production.



Three-view silhouette of the Bell. Note the long nose with, presumably, guns or cannon represented by the "feelers" shown.

"Indicator" Discusses Topics of the Day

Inefficient Efficiency?

Killing Individual Enthusiasm : The Need for Personal Interest in Aircraft Manufacture and Operation : A New Kind of Incentive : Debunking the "Power-plotters"

ONE of the more frightening aspects of present-day civilisation is this passion for efficiency at all costs to the human being for whose comfort this civilisation is, supposedly, designed in the first place. Competition being what it is, one accepts the necessity for producing the greatest number of items in the quickest and cheapest way, but there are still hundreds of industries and undertakings in which the best results can be obtained only by individual endeavour. Yet one can see this mania for efficiency creeping even into those undertakings.

And it *is* a mania—one of the most dangerous to which the human race has ever been subjected. If it is allowed to take charge we shall have, in a few hundred years, the complete ant-State, under which everyone will be mechanically and quite pointlessly happy and satisfied. While on paper the rationalisation of industry may appear to be so very neat and tidy, the ultimate result will be the end of the individual *per se*—and there seems to be very little object in a purely automaton existence, however well fed and well housed and well amused.

In any case, I claim that this "efficiency" is not always as efficient as it is made out to be, for the simple reason that a man or woman who can take a personal interest in a job is bound to be a better worker than one from whom this interest is being slowly but inevitably removed. This applies particularly to our transport services, whether seen from the maintenance or operational point of view.

Centralised Maintenance

Nowadays, the tendency in airline operation—and, I believe, in the Air Force—is to have a servicing department or maintenance wing whose job it is to maintain and overhaul a certain number of aircraft a week. "P. for Percy," "J. for Jitterbug," *The City of Timbuctoo* or *Nannette II;* it is all the same to them—just another aircraft of a particular type.

The working party have not got the personal and heroic interest in one particular aircraft which will always produce such extraordinary results, with such long, unpaid and happy hours of real work, when the same little crowd is working on the same aircraft. While the actual crew who might, with their own pet airship, have gone to no end of trouble to fit things out as they liked, will not bother to deal with just another flying machine. For last week's trip they may have had "J. for Jeremiah," and were just getting used to its little ways when they were sent off in *The Spirit of Tottenham Court Road,* with its oddly different oil pressures, the throttles which tend to creep back on take-off, the chart-lamp which will not stay fixed, and the dozen little faults which would not in the least irritate a crew which was used to these faults. In any case, a maintenance gang working with and for that flying crew would have somehow fixed all those little faults long ago, while the same gang, working merely on an aircraft with a particular number, will be interested only in making the aircraft serviceable in the shortest possible time.

Sooner or later, this absolute need for personal interest in a job of work will be rediscovered, and no doubt a company will then be formed to ask huge fees in return for the mere service of teaching firms how to run their businesses on personal lines. The company's slogan will probably be: "Personality Means Profits," or "Interest Increases Income." Every firm will be quite happy to pay out innumerable guineas in order to be told something that any kindergarten infant knows perfectly well without being told by anyone at all. In theory, the ant-efficient works or State may appear to be magnificent, but in plain, practical return it is doomed to dismal failure or worse. People are still people, and unless they are given a chance to show their individuality they may *make* that chance—with most uncomfortable results for all, themselves included. At the best, the team will be an inefficient one.

Enthusiasm Needed

And all this—though it may appear to be far removed from airline operation, or aircraft manufacture and design—is especially important in the world of flying people. If ever an industry or concern needed the personal interest and enthusiasm of all its servants, that of aircraft manufacture and operation needs it. Not only is it going to be a very hard fight for us after this war, but the industry itself, by its very nature, demands and encourages enthusiasm and individual effort. If we are going to make a success of civil flying a lot of very clever people may need to work long hours for small initial returns—and this kind of work is only possible when everyone feels that his or her personal interest is deeply involved, and that each individual hour of effort is of vital importance to the undertaking as a whole.

Human beings have always needed some kind of incentive to drive them to long and arduous labour. It can be the mere need to live at all; or the desire to live better than most and to ensure that one's children will have a better chance; or the strange desire to have the means and the power to rule other people; or, finally, it can be sheer interest and enthusiasm in a project for its own sake. The last is the feeling that must be present if we are ever to make anything of this semi-civilisation. All power may corrupt, and absolute power may corrupt absolutely. I think that the era of the power-plotters is over; we are growing out of it, and the English-speaking peoples, at least, have grown up sufficiently to laugh quietly but effectively at the Alexanders, Napoleons, Hitlers, and mere captains of industry who have no other ambition but their own aggrandisement. Power has been, or is being, debunked beyond possibility of reinstatement. The Führer of the future will be a modest, intelligent, easy-going and respected fellow who knows that he is not particularly much better than his fellow-beings and is certainly no demi-god either to himself or to his fellows. Far too many all-powerful people have proved themselves to have feet of a material much less stable than clay.

Workers of Utopia

The perfect State and the perfect industry must be inhabited by people who have a direct and genuine interest both in the work they are doing and in the meaning of this work in its widest aspects. And a comparatively new and struggling industry such as that concerned with the manufacture and operation of aircraft needs this individual interest more than any other. Just as the aircraft factory must not, for real efficiency and ultimate results, be peopled with slave-workers, the airline com-

INEFFICIENT EFFICIENCY

pany must not be run by mere aircraft drivers and mechanical operations clerks.

Even the present-day tendency to "train 'em young" has its dangers. Though an airline concern can be forgiven for wishing to get a maximum number of years' service out of its aircrew employees, it is not always as simple as all that, and it may be found that the enthusiastic pilot in his early thirties will give better total results over twenty-five years than the still unexploited and unknown youth who may have, on paper, thirty-five or even forty years' flying life in front of him. The man in his late twenties or early thirties at least knows quite well that this is what he wants to do, while the youngster may change his mind or prove to be unsuitable before his training as second pilot has been completed. And even if this youngster decides to stay in the business—either as a Transport Command or civil airline pilot—he may be doing so only because it is the career he has chosen and he does not feel inclined to start all over again. There are quite a few fellows in the Air Force who rushed in as young men, but who have long since lost any enthusiasm they once felt for flying, or for the R.A.F. as a career—and they are now merely high-ranking "passengers" in the scheme of things.

No; paper-efficiency, even with the help of the psychiatrists, is by no means everything it is cracked up to be. Give me men and women of any age who are really keen on the whole thing and who believe in it wholeheartedly—whatever it may be—apple-growing or airline operation.

INDICATOR.

A JET TO CATCH A JET

NEWS that the large-scale production of jet-propulsion aircraft turbines is projected in the U.S. has caused speculation in aviation circles that plans are under consideration for the use of jet planes as pursuit craft against robot bombs.

General Electric announced recently the conversion of large plant areas totalling 600,000 sq. ft. of floor space for the project. According to *American Aviation Daily*, another large manufacturer of aircraft engines has also been approached by the War Department to produce more turbines, as General Electric's capacity is not great enough for the proposed War Department schedules.

"The possible use of jet planes produced here have not been revealed," adds the journal, "but they may be used as pursuit ships against robot planes."

POST-WAR RESEARCH

MR. GRANVILLE (Ind., Eye) recently asked the Minister of Aircraft Production in the Commons if he was taking steps to retain a nucleus of scientific research and experimental industry for aircraft and radiolocation development, strategically disposed geographically throughout the British Commonwealth at the end of hostilities, for the purposes of defence against aggression and for the development of civil aviation, wireless and television, and other peaceful pursuits.

Sir Stafford Cripps, in a written reply, states that it is the policy of the Government to ensure that there is maintained in this country after the war a strong nucleus of research development and experimental work, both in Government establishments and industry, and to develop the fullest co-operation with the other members of the Commonwealth in any similar activities which they may decide to maintain.

It will be the purpose of the Government in doing so to seek to make the fullest arrangements for defence against aggression and also to assist to the utmost the development of the peacetime uses of these devices.

U.S. AIR TALKS WITH INDIA

THE Government of India has accepted an invitation from the U.S. to take part in informal and exploratory bilateral talks with various governments on post-war civil aviation.

Sir Girja Shakar Bajpai, Indian agent-general in Washington, will lead the Indian delegation, which will include Sir Gurunath Bewoor, Posts and Air Secretary, and Sir Frederick Tymms, Director of Civil Aviation in India, in the discussions which are expected to begin about the middle of August.

AIR HYGIENE IN EGYPT

ABDEL WAHID EL WAKIL, the Egyptian Minister of Health, has stated, while on a visit to America, that Egypt is to call an international conference to combat the transference of diseases by aircraft from country to country. The minister hoped that such a conference would be held within the next three or four months, "otherwise the war will be over before we have it."

Egypt expects a greatly increased share in post-war commercial flying.

BOOK REVIEW

Tunisia. Issued by the Ministry of Information through H.M. Stationery Office. 1s. net.

WARFARE is becoming more and more a matter of team work by all three Services working together. For every major operation a Supreme Commander is appointed, and in each case the man who seems most fitted for the task is chosen, irrespective of his Service—or, for that matter, of his nationality. Some thoughtful officers in all the Services are beginning to look forward to the day when there will be only one Service under one Ministry of Defence, and even (though this seems the most remote possibility) with one uniform.

But although Gen. Eisenhower always insists on the team work needed to win a campaign, the three British Fighting Ministries continue to issue their separate official reports for popular reading. In some cases this practice does no harm. The publication *Bomber Command*, for instance, dealt with operations in which neither the Navy nor the Army had any share. The first of these popular brochures, *The Battle of Britain*, also was chiefly concerned with the Air Force, though it could not say too much about the A.A. guns and the searchlights, because they belong to the Army.

The inadequacy of the present method of describing a campaign is most glaring when the majority of the fighting was done by the Army, and the War Office is responsible for publishing the story. Except in hill country, like the Apennines or Normandy, an army can no more fight without an air arm than it could without tanks; and in the two exceptional cases mentioned the Germans fought only delaying actions, without hope of final victory. Yet, when a land campaign is described in a brochure, it would be improper for the War Office to describe the part played by the Tactical Air Force which worked with it, except in a few general terms of compliment and gratitude. For this reason, *Tunisia* is a very disappointing publication. It gives only a partial picture, the picture of the fighting on the ground. An intelligent reader who wants to see the campaign as a whole needs an account compiled by the Ministry of Defence, which would not be afraid to talk about the two parts which made up the victorious whole. Anything less is bound to be unsatisfactory.

Even within the limits set by the rule that one Service must not describe the work of its two partners, *Tunisia* can only be praised for one feature—its illustrations. They are a fine collection of photographs. Some of them, it is true, have been enlarge to the point where they have almost lost their definition, but as a whole they are most attractive. Some of the maps are large and good; others are too small. There is a fine double-page aerial photograph on pages 14/15 showing a Fortress flying over rugged country, and one on page 40 gives a very clear view of Bostons with R.A.F. roundels. The work of R.A.F. ground crews gets a tribute on page 41, which shows an armourer doing some hefty work, though the uniform he is wearing, that most favoured in the heat (varying in shade from pink to tan, and popularly described as "the buff") does not emphasise the great gulf which officialism has drawn between the Services.

Of the letterpress one can only say that it is compressed to the point of dullness. It gives an uninspired list of place-names and dates, and tells where practically every division was on each date. In modern war, soldiers have learnt to feel an affection for their division, and sometimes for their Army group. Everyone has heard much about the 51st Division, while men of the Eighth Army are proud to wear a brass figure of 8 on the ribbon of the Africa Star. But to the non-army reader divisions and their numbers rarely mean much. They are not, for the most part, permanent formations like regiments, and therefore do not seem to have a personality which arouses a vivid interest.

It is as a collection of photographs that we can chiefly recommend this brochure to the public.

Engine Mountings

In this Second Article the Features of a Number of Mountings for In-line Engines are Surveyed

By MAURICE F. ALLWARD

A MUCH wider variation is apparent in the design of mountings for in-line than those for radials, although certain countries, in particular Germany, have standardised to a great degree. Basically, however, nearly all such mountings consist of two horizontal bearers, one down each side of the crankcase and parallel to the thrust line. These bearers are strutted back to the main structure, the type of strutting used depending chiefly, as in the case of radials, upon that part of the airframe to which the engine is to be attached.

German Mountings

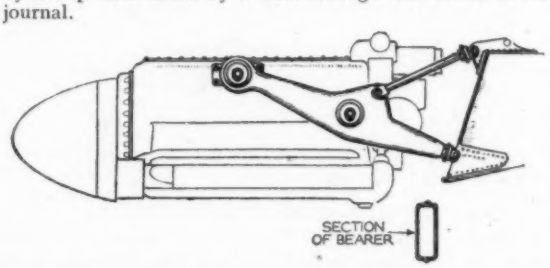
The mountings on the Me 109, 110, Ju 87, 88, and the He 111 are so similar as to be practically standard. The main horizontal bearers are electron forgings cantilevered forward of the top rear engine attachment points and supported by single tubular struts with welded-on end fittings. The cylinders are thus more accessible than if a fabricated tubular structure was used owing to the inverted position of the engines. The forging of the main bearers is very economical indeed when great quantities are required. One often wonders why some similar forging has not been developed over here for that war-winning engine, the Merlin. Maybe the answer lies in the position of the attachment points on the engine itself. The Germans have cut down the machining necessary between the forged blank and the finished bearer to a minimum. This consists of drilling out the lightening holes (they are not forged in order to obviate any small cracks that might develop at a later date), the holes for the engine feet, machining the rear attachment fitting and drilling the forked lug for the lower bracing member. On the Me 109, 110, and the Ju 88, the lower bearer pick-up points and the undercarriage attachment points are combined.

It would be interesting to know how the electron bearers stand up to damage by "enemy action." Once hit, they probably fracture under comparatively small loads, but as the engine itself is most likely unserviceable this is not considered important. When one bearer, which appeared to be similar to the British Specification D.T.D. 259 was tested, the results were illuminating. The Ultimate Tensile Strength was nowhere less than 18 tons per square inch and the minimum elongation over 10 per cent. The lowest proof stresses were found to be near the main bosses.

On the Me 109F1 each forging weighs about 30 lb., and the total weight of the complete mounting together with the cowling is 146 lb., or 7.1 per cent. of the basic structure, or 2.5 per cent. of the all-up weight.

On the Me 210 and the newer 410, which is the same as the former apart from more powerful engines, the mountings differ slightly. The main bearers are attached to the bottom of the engine bulkhead, and are supported in this position by tubular tie rods picking up with fittings at the top of the bulkhead. The bearers themselves are not electron forgings, but are built up from two halves of hollow light alloy stampings welded together to form rectangular section members. The arrangement is very clearly shown in the *Flight* sketch below.

All the mountings described above incorporate anti-vibrational mounting assemblies. The engine bearer fitting, bolted rigidly to the engine itself, forms a journal. Thick lozenge-shaped rubber pads are forced over this and form a saddle for the bearer. The pads are fixed in place by a cap held down by a bolt through the centre of the journal.

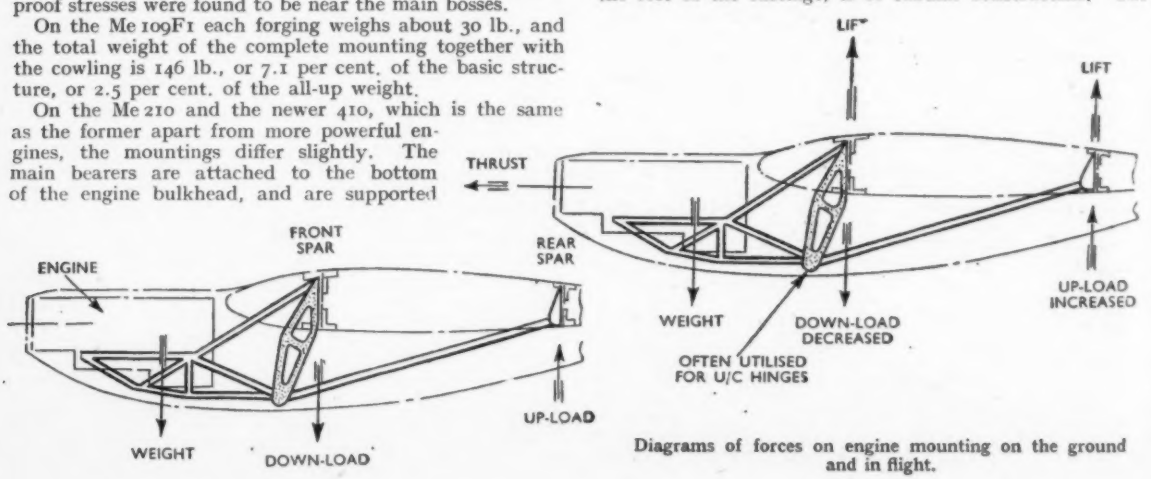


In the Messerschmitt Me 210 A-1 the engine bearers are of welded box section and the tubular bracing strut is a tension member. The two bearers are not connected by any cross-bracing, this function being performed by the engine itself.

One very interesting feature in the design of German mountings is that the two halves are completely independent and are not connected by any struts or cross bracing. Thus all the cross loads are taken by the engine which, in consequence, has to be suitably strengthened. The small frontal area of German warplanes is partly responsible for this aspect, as it is imperative the under engine contour line be as close to the engine as possible. This "pushes" the attachment points "up" the engine and thus cross bracing becomes impossible.

British Mountings

The mounting used on the Hurricane, in common with the rest of the fuselage, is of tubular construction. The



Diagrams of forces on engine mounting on the ground and in flight.

ends of the tubes are rolled in a rectangular section and bolted between steel plates, thus following the Hawker Patent method of construction evolved under the direction of Mr. Sigrist in 1925, and used for the first time on the Heron. This Hawker method of construction has now been used on no less than 29 different types of Hawker aircraft. This type of construction was adopted by Mr. T. O. M. Sopwith instead of welding because it eliminated the possibility of corrosion sometimes found underneath such joints. All the panels of the mounting are tubular braced except the bottom rear adjacent to the centre section front spar, which is wire braced. The engine itself is carried on four duralumin blocks, the rear pair being slightly offset inboard from the main structure on two subsidiary struts. Besides supporting the engine, the mounting carries numerous pieces of equipment and engine accessories. On the new Mark 11D it was found possible to armour the engine by attaching the plating direct to the mounting, as protection against small arms fire from the ground.

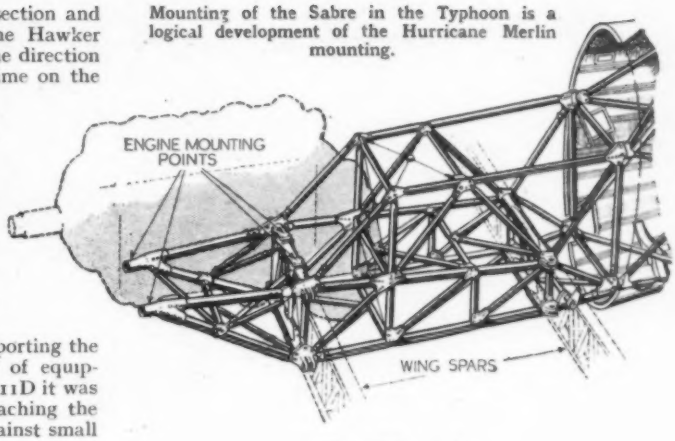
The weight of the mounting of the Hurricane Mark 11C is 68 lb. and it supports the 1,400 lb. of the Merlin XX.

The Typhoon

The mounting on the Typhoon is the logical development of that of the Hurricane. Although designed for the 2,000 h.p. and 2,500 lb. of the Napier Sabre, it is only slightly heavier than that of the former, with a weight of 100 lb. The distinguishing beard radiator is slung from the members of the two side panels between which the engine is cradled—another example of the strength and versatility of the Hawker method of construction, for with sufficient "g" this radiator can weigh 3,000 lb. or more. The mounting is a detachable unit and is bolted to the centre fuselage, or rather the front spar. The rear engine feet are actually located on the top boom of the front spar, which at first sight appears to pass right through the engine. This is due to the rearward position of the air intake aperture and the fact that it extends downwards for a considerable distance. All the panels are braced and the mounting is rigid without the engine. Although the bracing increases the weight, it is probable that had the engine been strengthened to take the stresses carried at the moment by the bracing, even more would have been added.

The whole unit lends itself for quick production by semi-skilled workers in some of the many "garage factories" dispersed throughout Britain, being basically a sort of Meccano assembly job.

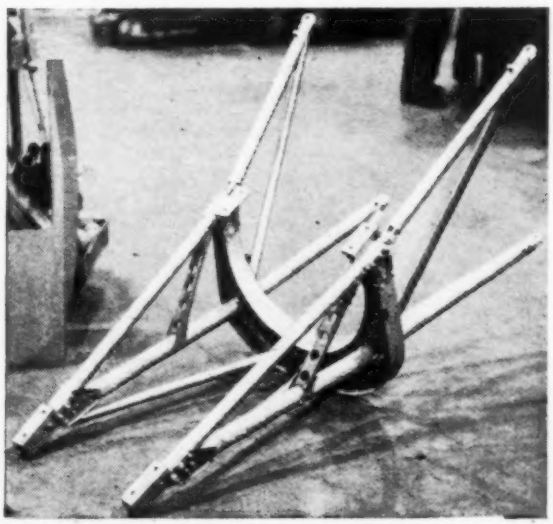
Mounting of the Sabre in the Typhoon is a logical development of the Hurricane Merlin mounting.

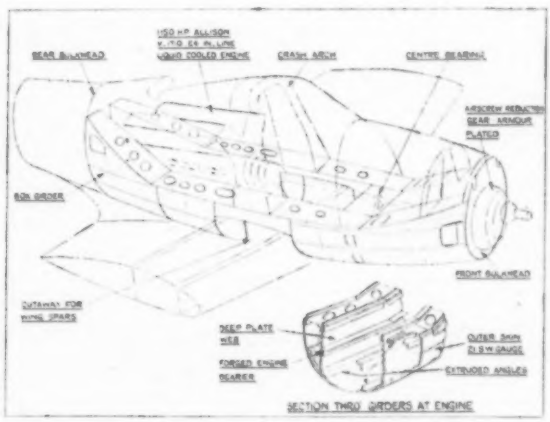


The Mosquito

The Mosquito seems to be well on the way to becoming one of the Great Aircraft Types of this Second World War, in the same way that the D.H.9 was one of the finest machines in the first one. Why is the Mosquito the success it is, and why is it so fast, are questions often asked? To answer the first, many factors would have to be taken into account, including the fact it is a delightful machine to fly—a point only appreciated as it should be by the Mosquito pilots of the R.A.F. The high speed is undoubtedly due to its excellent aerodynamic qualities and superb external finish.

The De Havilland design staff, although faced with the problem of harnessing more than 1,000 h.p. to a wooden wing as cleanly as possible, encountered no serious structural problem. An indication of the success achieved is the remarkably small frontal area of each nacelle. The position of the engine is such that the top of the cowlings is in line with the top of the wing, thus favouring air flow over it. The whole mounting is entirely welded and thus suitable for mass production once the jigs have been made. Welding presents serious problems due to distortion, but these were succesfully overcome by knowing what allowances to make, due to the long experience De Havillands have had with it on this type of construction. Each mounting weighs 87.8 lb., and picks up the main structure at four points—two at special fittings forward of the bottom boom of the front spar, and the other two at points well below the wing contour, which also incorporates the undercarriage pivot bearings.





Unlike most mountings, that of the Spitfire (left) has a transverse "horseshoe" member. In the Airacobra (above) the engine is located well back in the fuselage, with resulting change in mounting system.

ENGINE MOUNTINGS

A point of interest is that the complete mounting is interchangeable with the Rolls-Royce mounting on the Beaufighter, though the latter is a bolted-up structure.

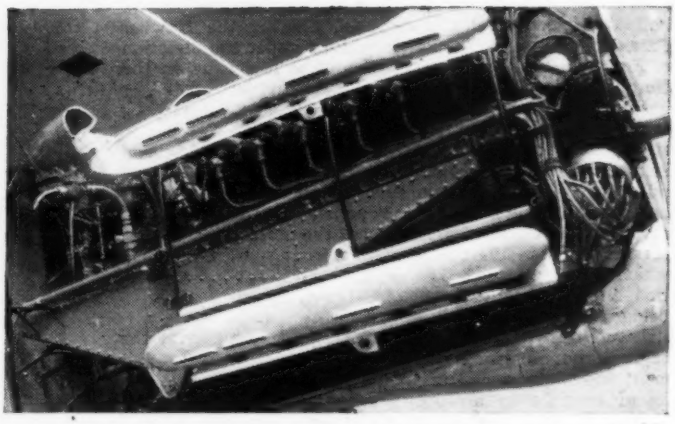
American Mountings

The Mustang was designed to a British specification, and this may have accounted for the mounting being as compact as it is, although the construction differs appreciably from British practice. The "horizontal bearers" incorporate the "integrating" structure, and are made up from plate webs and extruded top and bottom members. This construction is suitable for mass production. Similar to German practice there is no cross-bearing, the bearers being independent of each other. The box-like structure facilitated the mounting of the two-nose 0.50in. m/g.s., and allowed the armament to be increased without weakening the wing. To remove the mounting four bolts only have to be removed.

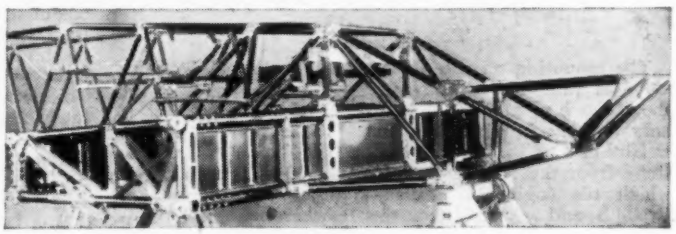
Now the Mustang is being fitted with the Packard Merlin, it will be worth while noting whether the mounting for this is similar to that used for the Allison or whether the design is altered.

The Airacobra

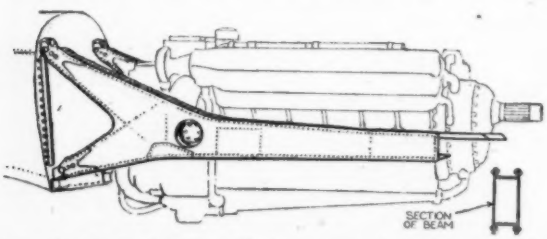
The Airacobra, one of the most unorthodox fighters of recent years, has a very unusual engine mounting, which is rather similar in construction to that of the old Mureaux 170 fighter. The position of the engine is nearly ideal from the weight and manœuvrability points of view, and although the mounting of the engine itself gave little trouble, the attachment of the airscrew reduction gear and shaft drive assembly at the front of the machine presented an immense structural problem.



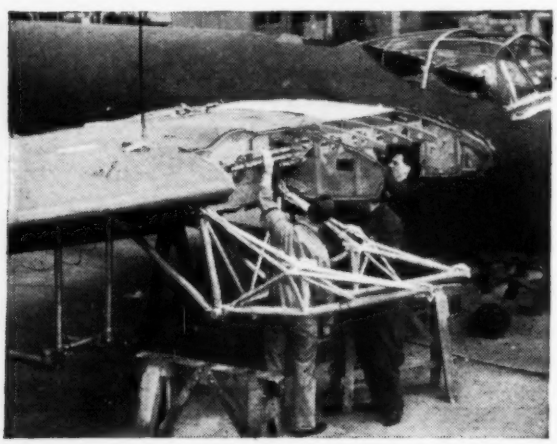
In the Hawker Hector the engine mounting was built up and resembled that of the modern Mustang or the welded box bearer of the Me 210.



Merlin mounting in the Hawker Hurricane follows the standard and typical Hawker fuselage construction, with tubes and fishplates.



In the North American Mustang the engine bearers are of horizontal "Y" shape and of riveted box section. It may be compared with the Me 210 mounting on p. 120.



The mounting of the Merlin engine in the De Havilland Mosquito. There is no cross-bracing between the two bearers other than that provided by the engine itself.

The Problem of Flexing

Flexing of the fuselage is usually undesirable at any time, but in this case it was imperative that the structure be as stiff as possible. The fuselage was thus built up from two massive "box" girders, cradle shaped in profile, running from just aft of the engine to the front bulkhead. These girders, although evidently primarily for the engine installation, provided a firm fixture for the bearing of the nose wheel oleo leg pivot. The airscrew is some 12ft. in front of the engine, necessitating 10ft. of special shafting. This, and the special centre bearing, increased the weight by 50.7 lb. To the rear of the girders are two sturdy forged angles for the engine itself, which is mounted on four "Fabreeka" pads inserted between the engine lugs and the angles. It is held down by eight bolts arranged in pairs, through brackets riveted to the webs. The two girders, although giving the Airacobra its required stiffness, also gave what is perhaps its greatest defect—non-serviceability in the field. It is hard to imagine how the girders are repaired if damaged by enemy action. The serviceability of the Airacobra on the whole is poor—there is a popular rumour that once it took a small army of mechanics, engineer officers, and AC "Plonks" nearly three days to remove a broken instrument from the instrument panel.

It has been reported that quite a lot of research has been carried out by Messrs. Rolls-Royce and Packard on the Allison style of extension shaft with the object of installing a Merlin 61 in the Airacobra. If this is possible, another great drawback—loss of performance with height—will be eliminated, and the Airacobra should be able to show by deeds and not advertisements that it is a "concentrated dose of very bad medicine for the Axis."

No Helicopters for Canadian Bus Lines

Applications for Post-war Services Refused : Air Not to be Tied to Surface Transportation : Amendments to Aeronautics Act

MANY bus lines in Canada have made application to the Hon. C. D. Howe, Minister of Munitions and Supply, for licences to operate helicopter services after the war, Mr. Howe informed the Canadian House of Commons during discussion of a Bill to create an air transport board. He said the idea of the bus companies was to prevent competition with their surface services.

The Government took the view that if the helicopter had merit it should be permitted to develop on its own and not be tied up with surface transportation. For that reason it was proposed that the new policy of separating airlines from railways, which will be effected by the Bill, would apply to prevent a tie-up of helicopter and bus services.

"The commercial helicopter has yet to be invented," declared Mr. Howe, adding that it would be at least some years before the machine could be used on a commercial basis.

Mr. Howe's statement was elicited by Mr. Gordon Fraser, Progressive-Conservative member for Peterborough West, who expressed the fear that helicopter developments would be held up by refusing bus companies permission to operate helicopter services. He said he was particularly interested because his constituency had poor train connections and no air services. It should be possible to link such cities with points on main airlines.

Effect on Private Enterprise

Mr. John R. MacNicol, Progressive Conservative, Toronto-Davenport, stated he was concerned lest private enterprise be forced out of airlines.

Mr. Howe said the Bill did not extend the functions of Trans-Canada Airlines nor prevent the extension of private enterprise in aviation. It *did* prevent concentration of lines in the hands of the railways. The Government entered aviation in 1936 because private companies were not prepared to provide a service on a scale commensurate with aviation developments. At that time the policy was adopted that the trans-Canada service should be non-competitive. That was still the policy.

The ownership of Trans-Canada Airlines stock by Canadian National Railways seemed a logical move at the time, but the result had been a tendency for other lines to be concentrated in the hands of the other railway, and this was not considered desirable.

Mr. M. J. Coldwell, C.C.F. leader, said he hoped the Minister would not recede from his announced aviation policy. He believed all airlines, north and south as well as east and west (except possibly small feeder lines and taxi lines) should be in the Government-owned system.

Mr. Howe, he said, could rightly take pride in T.C.A.—"a worthwhile contribution he has made to this country during his tenure of office."

There should be a labour code written into the Bill to govern wages and conditions of employment for airline employees.

Mr. Howe said it was not usual to put labour conditions in a statute. Airline employees, like railway employees, were organised and had satisfactory agreements. Any stipulation on labour matters in a statute might be out of date in a few years.

Future of C.P.A.

Canada's policy for divorcing air and surface transport companies after the end of the European war has a possible loophole, it was learned when the amendments for the Aeronautics Act came up in the House of Commons recently.

The amendment provides that no licence for commercial air service shall be issued to any person "engaged in the transport of goods or passengers for hire or reward by means other than aircraft unless the Governor-in-Council is of opinion that it is in the public interest that such a licence be issued."

How this amendment will affect the Canadian Pacific Air Lines, a subsidiary of Canadian Pacific Railways, is not yet known. Under Government-announced policy C.P.A. must be broken up into its previous component companies and divorced from ownership by the C.P.R.

The amendments to the Aeronautics Act also call for the establishment of a three-man Air Transport Board, appointed for periods of ten years.

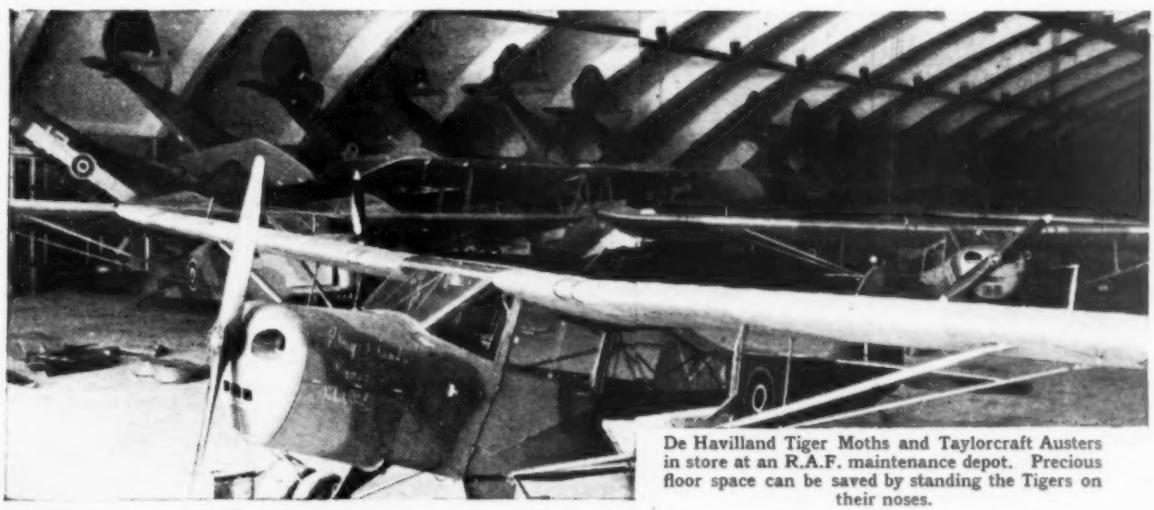
WERE THEY JET PLANES ?

ALTHOUGH there has as yet been no news of jet-propelled aircraft in operational service either by the Allies or the Germans, a phrase used by one correspondent in a dispatch just after the invasion of Normandy was launched has been quoted by the American journal, *Iron Age*, as suggesting the possibility that the enemy were using this latest type of power unit.

The dispatch referred to German fighter-bombers swooping so low over the Western Beachhead that *their heat blasted him in the face*.

This phrase may, of course, have been merely dramatic writing, but, says *Iron Age*, "it may have been the correspondent's device to get through censorship information that the Germans are using jet planes. If so, this would be the first use of jet aircraft for military operational purposes by any belligerent."

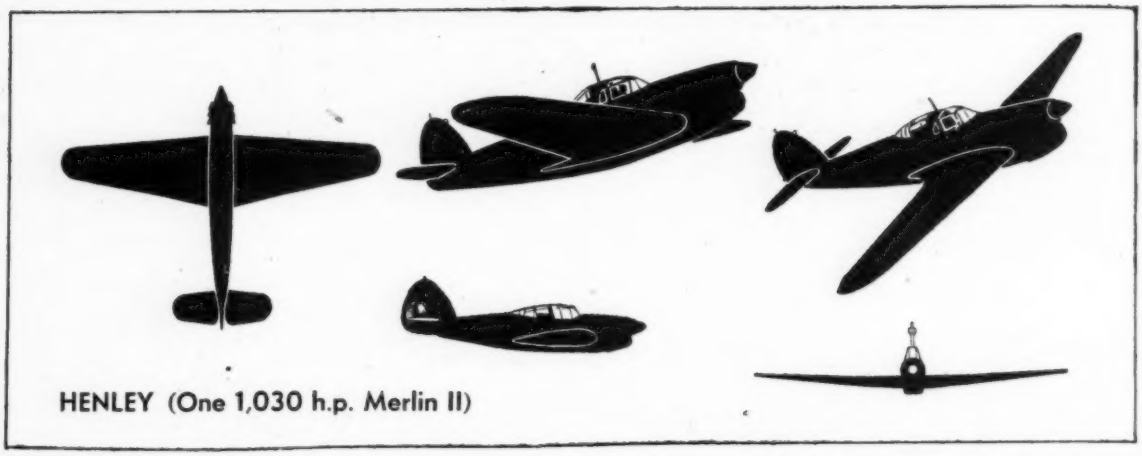
TAILS UP



De Havilland Tiger Moths and Taylorcraft Austers in store at an R.A.F. maintenance depot. Precious floor space can be saved by standing the Tigers on their noses.

Studies in Recognition

Aircraft in Fl

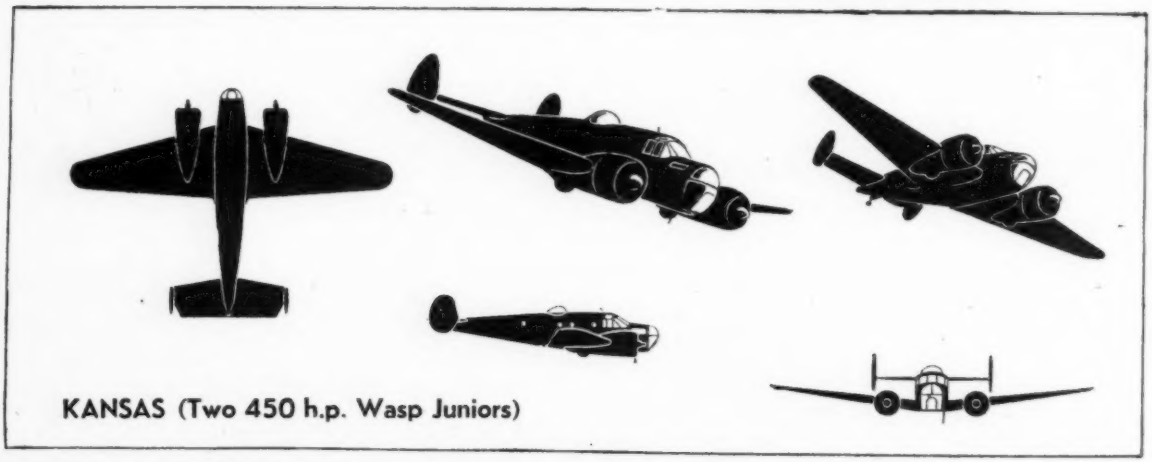


HENLEY (One 1,030 h.p. Merlin II)

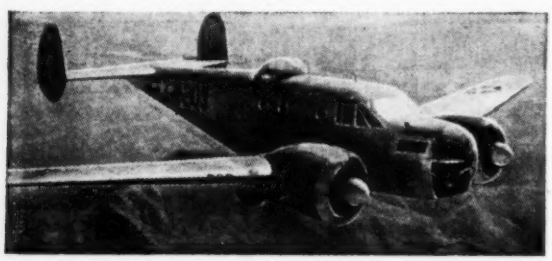
BEARING a strong family likeness to the Hurricane, the Hawker Henley was designed as a light two-seater bomber, and a fighter version with a power-operated gun-turret (similar to the Defiant) was also developed experimentally just before the war. But the type never went into production; instead it was selected for target towing when the advent of the fast monoplane combat type made the older biplane tugs obsolete. It is powered by a Rolls-Royce Merlin II and has a top speed of 272 m.p.h.

Low wings taper (mainly on trailing edge) and have dihedral angle from roots; rounded tips. Tail unit similar to Hurricane. Fuselage also typically Hawker; well-streamlined cockpit cover; prominent beard radiator. Dimensions: Span, 47ft. 10in.; length, 36ft. 5in.; height, 11ft. 9in.; wing area, 342 sq. ft.

Hawker Henley Target Tug.



KANSAS (Two 450 h.p. Wasp Juniors)

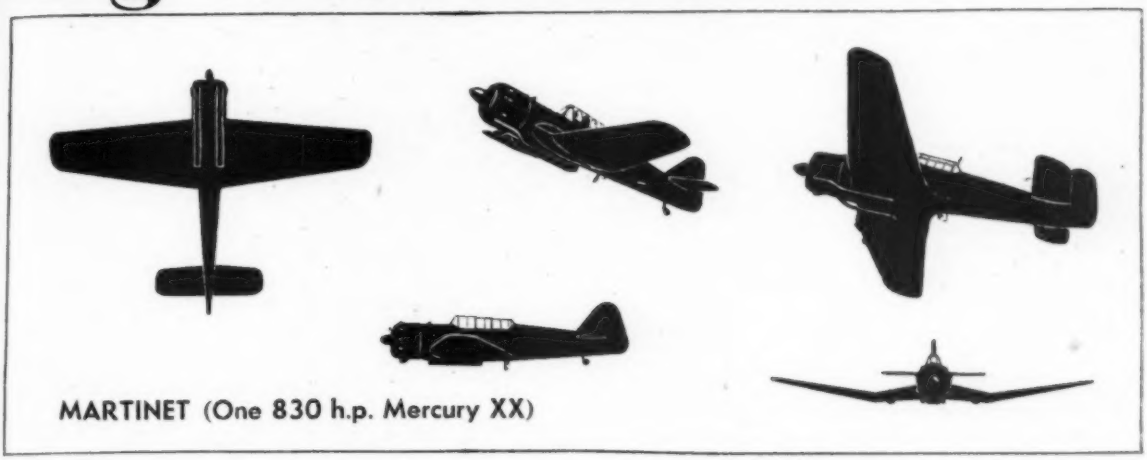


Beech Kansas (AT-11) Trainer.

LIKE all Beechcraft trainers, the Kansas is claimed to combine near-tactical cruising speed with low landing speed and easy handling. Its duties are to provide training in bombing and flexible air gunnery. Its U.S.A.A.F. designation is AT-11, but to the U.S. Navy it is the SNB-1. A pair of 450 h.p. Pratt and Whitney Wasp Junior radials give it a top speed of some 210 m.p.h., and it carries a crew of three or four.

Recognition features include low wings tapering (from roots) mostly on the leading edge, with small round tips and with fairly pronounced dihedral, also from the roots. The high tailplane has a backswept leading edge and straight trailing edge, and carries twin "ear-shaped" endplate fins and rudders. Wide, deep fuselage has blunt glazed nose and astro-dome. Dimensions: Span, 47ft. 8in.; length, 34ft. 3in.; height, 9ft. 5in ; wing area, 347 sq. ft.

Flying Attitudes

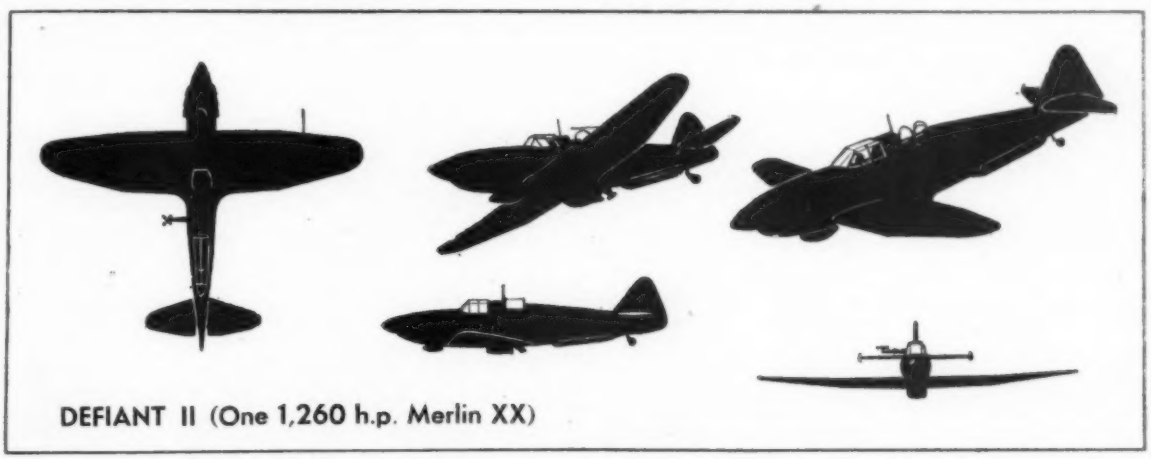


MARTINET (One 830 h.p. Mercury XX)

Miles Martinet Target Tug.

IN contrast to most target towers which are modifications of obsolescent operational types, the Miles Martinet was evolved specifically for the job and is in regular service at a number of R.A.F. gunnery schools. It was developed from the Master II advanced trainer. Powered by an 830 h.p. Bristol Mercury engine, it has a top speed (without drogue) of 232 m.p.h.

Like the Master, it employs the inverted gull wing tapering in plan from the roots to raked angular tips, and a typically Miles tail unit. A shallow rectangular box beneath the centre section houses the towing gear and is flanked by twin exhaust pipes running back from the rear of the cowling. Aft of the "glasshouse" the fuselage has a straight taper and is slim in plan. Dimensions: Span, 39ft.; length, 30ft. 11in.; height, 9ft. 6in.; wing area, 238 sq. ft.



DEFIANT II (One 1,260 h.p. Merlin XX)

FIRST of the modern operational fighters to be modified as a target tug, the Boulton Paul Defiant II augments the Henleys and Martinets in this important phase of R.A.F. Training Command. Powered by a 1,260 h.p. Rolls-Royce Merlin XX, it has the very useful top speed, with drogue in tow, of 260 m.p.h.

Wings, tail unit, and main characteristics of the Defiant remain the same, but the once-familiar four-gun turret has, on the tug version, given place to a raised cockpit cover. Visible additions include the winch projecting from the starboard side of the cockpit, the short towing arm immediately behind the 'midships radiator, and the shallow drogue container aft of the arm and extending to near the tailwheel. Small protectors have also been added to the tailplane tips. Dimensions: Span, 39ft. 4in.; length, 35ft.; height, 11ft ; wing area, 250 sq. ft.

Boulton Paul Defiant Target Tug.

Behind the Lines

Service and Industrial News from the Inside of Axis and Enemy-occupied Countries

They've Noticed!

"THE R.A.F. instead of the infantry seems to be the 'Queen of ALL Arms,' with the British armed forces," says the German military commentator Sertorius.

Taken-over

THE Rumanian air transport company "Lares," has been militarised and placed under the control of the German General Staff or a military authority to whom the Germans may delegate such powers.

The "Lares" was hitherto controlled by the Rumanian Government.

Admission

"UNLESS flying bombs destroy London, we shall have made a fatal mistake in diverting the *Luftwaffe* efforts from operations on the battlefield," said a dispirited Reichswehr colonel, quoted by Reuter.

This story was told by a business man who has just reached Lisbon by car after a three-day journey from Paris and who gave the hitch-hiking colonel a lift.

"Our supply lines," said the German officer, "are so damaged that we are now actually short of ammunition. On the other hand, the enemy's fire, combined with bombing, represents a far more concentrated attack than has ever been put up by the Russians on any one sector of their front."

Appointed

COL. GEN. von STUMPF, appointed by Goering commander-in-chief of all *Luftwaffe* units inside the Reich, is a 54-year-old East Prussian and a personal friend of Goering.

The post which hitherto formed part of the Reichmarshal's responsibilities is new, and is, of course, a promotion. Up to July 20th Stumpf was C.-in-C. of the Air Fleet "Reich" charged with the defence of the Reich against air attacks.

Von Stumpf came to the *Luftwaffe* from the army, and while his operational experience is limited, he is reputed to be a first-class administrator and organiser. As he is considered by the Nazis to be absolutely loyal and dependable he was given full powers and was entrusted with the new command established for the event that the air force units would have to be employed to quell internal disorders.

Doodle-bug Hanna

HANNA REISCH, the well-known German airwoman, has been awarded the Iron Cross First Class for flying in a V.1 air torpedo and solving problems which could not be otherwise elucidated.

In announcing this the Berlin radio added that the V.1 was fitted with a special landing device. She was seriously injured while landing.

Hanna Reisch came into prominence in 1938 when she flew a Focke Wulf Fw 61 helicopter inside the *Deutschlandhalle* in Berlin.

Allied Superiority Acknowledged

A SINGULARLY frank admission of *Luftwaffe's* inferiority was given in an editorial of the *Berliners Lokal Anzeiger*. After saying that "Allied Naval Artillery's bell of fire which covered the landing will assume the same importance should the defenders intend to drive the invaders back to the sea," the article makes this significant statement:

"In Western Europe"—the article continues—"the defenders' positions must always expect to be under a bell of fire, since their own *Luftwaffe, which has gradually been detached to cover more and numerous fronts, has been increasingly surpassed by the Naval Air Arm.*

"The defenders must always expect it, since the Navy has, so to speak, grown enormous protecting wings, which, owing to the development of the situation, cannot be opposed by anything equivalent.

"The defenders must expect it ever since the bell of fire was used for the first time on a large scale in Sicily, that is, ever since developments in the air have decisively overthrown the old principle that a Navy should not enter the coastal sphere of a superior Air Force."

A note of warning is struck in the conclusive remarks of the article: "The problem becomes even more difficult (for the defence) when applied to the 'Fortress of Western Europe,' where the defenders have for the first time made an endeavour to fortify not only harbours but hundreds of kilometres of coast within a limited time and under other tremendous burdens of armament production."

Tactics

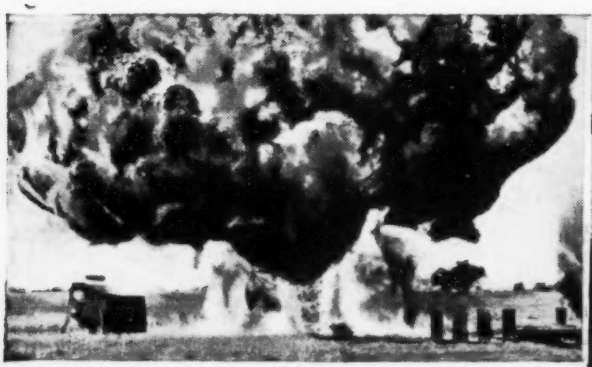
UNDER the heading "Close-combat fighters," the *Militarische Correspondenz aus Deutschland* gives this version of the new assault tactics of German fighter aircraft: "As wedges of bombers flying in close formation have a very high defensive power it is almost impossible for single fighters to operate with success. Only stronger fighter formations stand a chance of success, provided they attack together.

"The tactical method of the assault *Gruppen* of *Luftwaffe* fighter squadrons consists in approaching the bombers up to close-combat range, regardless of the enemy's defensive fire, so that definite results become possible. If the bomber does not lose height after the first approach, the fighter immediately proceeds to ram him.

"Ramming the opponent has thus for the first time been systematically introduced as part of air fighting tactics," says the article, forgetting that it was the Russians who had first introduced the wide practice of this art. "The tactics of the close-combat fighters presuppose the maximum effort on the part of the individual and the aircraft. The crews are chosen accordingly.

"A bomber wedge formation is broken up to such an extent by a closed fighter assault that it can no longer be effective in close combat.

"German experts stress that the tactics of the assault *Gruppen* cannot yet be considered an entirely satisfactory panacea in the face of massed bomber attacks by day. It is believed, however, that the perfection of this method will soon raise the ratio of the losses of the attackers in an unmistakable manner."



HEART STOPPERS: Gen. Milch and Prof. Speer watching a demonstration of secret weapons about which Dr. Goebbels told his disappointed listeners that it almost stopped his heart beating.

International Air Transport

*Some of the Problems Examined and Classified : Range of Opposing Views Developed**

By Dr. EDWARD P. WARNER

AIR transport is a case study in international economic relations. It has its own peculiar features; but it presents also many of the same problems as shipping, or the international trade in raw materials, or the contest for markets in manufactured goods. It is important in itself, as a service to mankind and a source of productive employment; but it is important also as a particularly dramatic symbol of the struggle to make the mechanical products of human ingenuity contribute to the creation of peace, happiness, and security rather than to their destruction, to the creation of understanding rather than distrust, and to the abatement of conflict rather than its embitterment.

It is a field in which there are many opinions, but their divergence is concerned almost exclusively with the means of accomplishing the ends upon which all agree. Everyone desires that air transport should be so developed as to create no threat to international security, but rather to enhance it by putting a new instrument in the hands of peace-seeking nations. Everyone agrees that the world should be girdled by swift and direct air transport, with the least possible administrative encumbrance to its passage of frontiers. Everyone agrees that air transport's steady march towards the status of a self-sustaining branch of commerce ought to continue, and that there should be no relapse into a permanent dependence on progressively expanding subsidies. Everyone is opposed to unfair or wastefully duplicative competition.

We all want the same things. Coupled with the more abstract purposes, the young people of many nations seek personal opportunity to share in the development of air transport on a world-wide basis. Again, as when young Britain's spine tingled at the magic name of Drake, and as when the legends on the prows of clippers made Salem known in every port of the world, and boys of New York and New England ran away to sea, the imagination girdles the globe; and young folk trained for battle and still in school see the vision of their own future in great-circle courses swung boldly across the map.

But with all this identity of purpose, the problems of method remain. In large part they resolve themselves into the single problem familiar to every branch of both domestic and international economy, of the contest of laissez-faire against control. Since there is not, either in air transport or elsewhere, any such thing as either complete laissez-faire or complete control, the distinctions of opinion become concerned with the kinds of controls that are to be applied, the degree of their rigidity, and the sources of their authority or the sanctions that support them.

National Opinions

Opinion on these matters, as upon so many others, refuses to arrange itself in neatly labelled national pigeon-holes. There is no such thing as American opinion, or British, or Canadian, or that of any other national as a single uniform entity. Government formulate their policies and act upon them; but in each country a vigorous debate continues on the form that the national policy should take.

The discussion has been plagued by misleading slogans and shibboleths. The outstanding example has been the discussion of "national sovereignty in the air space" and "freedom of the air" as though they were antithetical and mutually exclusive concepts, between which it now lay open for us to make a choice.

"Freedom of the Air" in the present sense of the phrase would be the extreme degree of mutual concession of privilege among nations. Theoretically it might extend to conceding the airlines of every nation the right to carry traffic between any two points in the world. Actually there is not the slightest chance of a general acceptance of anything even remotely approaching that degree of freedom of action. A less sweeping concession, although still a very unlikely one, would leave it open to any operator to carry passengers and goods on any international route, subject only to restrictions against carriage between any two points in the same country. Continuing to trim down the degree of freedom by progressive stages, a third possibility would be a recognition of the right of any airline to run routes between its own national territory and any other part of the world, picking up and discharging traffic along the way but without the privilege of establishing international services completely disconnected from the homeland.

Transit and Technical Stop

The next stage of restriction would eliminate consideration of any rights to pick up and discharge passengers and goods, leaving such rights to be separately determined by agreements on a more limited scale among small numbers of nations directly interested in a particular route. The general exchange of privileges through an international convention of general membership would then be limited to assuring the rights of passage through national airspace without a stop, and of stop for refuelling purposes only. Those are the doctrines commonly referred to as the "right of commercial transit" and "right of technical stop." If generally accepted they would assure that any two nations which made an agreement for the establishment of an air service to carry traffic between their territories would be able to establish that route, however far apart the two nations might lie, without further negotiation with each intervening State for the right of flying through its air space en route between the terminals; since that right would have been conceded in general terms by all the governments ratifying a general convention containing the commercial-transit and technical-stop provisions.

The various degrees of freedom that I had mentioned previously are almost certainly beyond the range of the present inclinations of any considerable number of governments. The general concession of the rights of commercial transit and technical stop, however, seems within the bounds of practical possibility. It has already had favourable mention by President Roosevelt, and by the authorised spokesmen of the British Government, and it has been included in a formal declaration of the purposes of the Canadian Government in international air transport development. The universal concession of the privileges of commercial transit and technical stop would seem to be one of those arrangements by which everyone would gain, while no nation would lose any rights in any traffic that actually originated or terminated within its territory, or lose any other right except the right to play dog in the manger.

Such privileges as those, capable of being stated in general terms, may be expressed in a general convention to which universal adherence may be hoped for. Arrangements to cover the handling of traffic, on the other hand, are almost necessarily drawn for particular routes or areas, and so affect only a limited number of countries. The simplest case is that of two nations making an agreement like the United States-Canadian air transport agreement of 1940, which relates only to the air routes that touch only the territories of the two. More complicated cases are those

* Extracts from an address given before the Institute of Public Affairs at Geneseo, New York. Dr. Warner, it will be recalled, is vice-chairman of the American Civil Aeronautics Board and read last year's Wilbur Wright Lecture before the Royal Aeronautical Society.

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of routes that touch upon a number of countries, with passengers to be picked up and dropped at one or more points in each, and perhaps with each of the countries along the route wishing to have its own airlines participate in the operation. In such a case as that of a line traversing Europe from its Atlantic shores to the Balkans, or extending on into and across Asia, the number of nations affected may be large and the resultant arrangement very complex indeed.

Here again the exchange of privileges among the particular group of nations concerned may take many forms, and be subject to various degrees of limitation. The equivalent of complete freedom, when reduced to a two-nation or three-nation scale, is a simple reciprocal agreement that each nation's airlines may operate over a particular route connecting the various countries concerned, without limit on the numbers of airlines of that nationality that are to be allowed to participate, without limit on the rates of fare that they may charge. The rights received by each of the nations joined in agreement with respect to particular routes may not, however, go that far. They may be limited, by the terms of the agreement or by the establishment of administrative controls.

Commercial Competition

The discussion of future possibilities is wide; and in the past they have often been of drastic severity. As I have already noted, the competition between carriers on international routes might be left free and unlimited in every respect, in the hope that the carriers' own commercial ethics and their instincts of commercial self-preservation and desire to avoid retaliatory campaigns would keep competitive practices within reasonable bounds. Competition might be limited to the extent of requiring each participant to have the approval of its own government, but otherwise unrestricted. The number of the participants in the competition might be further controlled through international agreements. The rates to be charged for commercial service and the relation of the rates for the type of service rendered might be subject to agreed controls. The number of aircraft operated each week or the total volume of capacity offered for the accommodation of traffic by each of the competitors might be controlled; while as a final possibility, representing the highest degree of suppression of competitive effort would be compatible with and survival of private initiative in management, the total revenues of a route might be distributed among the various participating airlines in some previously agreed ratio, without regard to the actual distribution of their patronage. Each of those various types of control had some application in the years before the war, and each of them will have both warm advocates and vigorous opponents in planning for the future. The questions of control over commercial tariffs and the control over frequencies, or the number of schedules that a carrier may operate in a week, are likely to be special bones of contention. If limits on frequency of schedule are insisted on by any of the participating nations, there will be a further question on the basis on which such limits are to be established and of the means of determination of the indices of national need or national ability to contribute which would fix the relative importance of the shares which the various nations would take in the operation.

For each of the various schemes and systems of control there are various possible sources of power. Such control as is to be exerted over air commerce (if any) may be accomplished, as previously suggested, through the terms of an international air navigation convention ratified by a large number of nations, as the international convention drawn in Paris in 1919 secured the adherence of some 30 States, and greatly facilitated their aerial communications in the years between the wars. It may on the other hand be purely national, with each government acting at its own discretion in matters affecting its own airlines. It may be by fixed and rigid agreement among two or three nations, written in terms expected to remain long in force. It may be through the more flexible device of a frequently renewed collaboration among the aeronautical authorities of the nations concerned, free to adjust the position at suitable intervals to changing conditions. It may be the work of an international tribunal, dealing with the problems of international services as State and Federal commissions deal with the regulation of competition in various branches of the internal economy. Or, finally, it may be wholly extra-governmental in character, the product of purely commercial arrangements among the airlines concerned, and supported by the sanction of threatened expulsion of non-co-operators from the organised society of airline operators and withdrawal of the benefits of their membership.

There are too many of these possibilities for me to discuss each of them in detail, but some possess a special interest. Regulation by the airline of their own affairs, for example, follows the traditional shipping practice of control of competition through interline conferences. It is a practice that has the force of general employment among the shipping companies in Europe, but one in the development of which the United States has so far played a minor part. The similar fixing of airlines rates by agreement among the lines was a common practice in European air transport before the war. In many instances it extended even to the pooling of the total revenues received from a particular route, and their distribution among the participating carriers in an agreed ratio. It has already been apparent that some of the personnel of pre-war airlines look back on the days of such interline pooling with nostalgic affection, and hope for their return. To American opinion they will in general make less appeal, for any international agreement for the allocation of business is suspect here.

Governmental Control

It was common in the pre-war period to leave such questions of competitive practice for direct settlement among the carriers themselves; but in some cases the controls were at least kept in governmental hands to the extent of incorporating in a basic air transport agreement a limitation on the amount of operation that each of the parties would be allowed to conduct. Thus the first agreement that covered air transport operation across the Atlantic, entered into by the United States, the United Kingdom, the Dominion of Canada, and the Government of Eire in 1937, provided that a British and an American airline would each operate a maximum of two schedules a week in each direction across the North Atlantic. The incorporation of such details in a basic agreement results in a regrettable rigidity; and interested opinion is now divided between those who believe that no control at all over frequency of service is desirable, the matter being left entirely to the arbitrament of free competition among free operators; those who believe in the regulation of frequency in conclaves of the airlines, with governments either excluded or holding a purely observing rôle; and those who favour the establishment of genuinely international tribunals to deal with such matters. Proposals of the latter class, such as have been brought forward within the last few weeks in extensive detail by the Canadian Government, present the classic problems of international government and of determining the feasibility of entrusting large executive responsibilities or powers of final judicial interpretation to newly created international agencies, as yet untried and unpossessed of any record of achievement upon which to build public confidence. This is the problem that we shall confront in a score of fields, where the facile course may be to propose placing all the problems in the lap of newly created international agencies to solve. On the other hand there is a large body of opinion which feels that a wiser course might dictate a slower and more limited progress, with confidence in new institutions gradually built up from their achievements, however limited the initial scope of their activities may be.

It would be inappropriate to break off the discussion of

(*Concluded at the foot of page* 130.)

European Air Transport

Czechoslovakia's Views and Ambitions : Need for World Conference : Step-by-Step Growth of International Organisation

ONE of the many thorny problems which will have to be solved in the rebuilding of Europe is the organisation of international air transport. Before the war Czechoslovakia held an important place in this sphere, and in order to discover the views of that nation we have obtained an interview with Air Vice-Marshal Karel Janousek, K.C.B., who is Inspector of the Czechoslovak Air Force and who was, before the war, in command of an Air Force Area in Czechoslovakia. He has been associated for many years with technical development in his country. The interview is presented as a series of questions and answers.

WHAT do you consider the most effective organisation of post-war European air transport? And what should be the first steps towards it?

A.: I do not look upon air transport from the purely economic point of view; as I see it, air transport represents one of the most effective means of furthering international understanding, and is thus one of the best instruments of peace. As it is my belief that future peace cannot be secured on a regional basis but only by the firm resolution of all civilised nations, I also regard a close collaboration of all countries as the only sound basis for the future organisation of air transport. Thus the European organisation of air transport can only operate as part of a world organisation. An efficient world air service which is to meet future requirements cannot be built without the full participation of the United States of America and the Soviet Union. A world conference on air transport of all the Allied nations should be convened in the very near future, and if peace is to be ensured for the future generation, the so-called small nations must not be "kept down."

Q.: Should the scope of some future international authority be limited to technical standardisation and co-ordination, or should such authority have wider powers so as to give it the rights to control and grant licences for the operation of air lines?

A.: The international organisation of air transport must be built successively. Our first aim should be the achievement of standardisation and co-ordination. This will present many difficult problems. The healthier international relations become, the more effective can be the building of an international organisation which will ensure the efficient working of air transport with the minimum of expenditure. I do not anticipate such favourable development which would enable this organisation to act, in the near future, as an International Licensing Board. Before this is possible, the international organisation can do much good by eliminating excessive competition and acting as a mediator between competitors. An international authority will deal with all questions concerning standardisation and airworthiness of aircraft, equipment, international air law, etc.

World Routes

Q.: How do you envisage the organisation of future transatlantic, transcontinental and trans-European trunk routes?

A.: The United States, Great Britain, the Soviet Union, and the so-called small nations will each view this problem from a different angle. I can talk only from the Czechoslovak point of view. It is our vital concern to open up our airlines immediately after the war. Czechoslovakia has no outlet to the sea; the air is her sea. If our air transport is to be built on a sound foundation we must proceed step by step. We shall probably not be able to begin operating our own airlines to, say, the United States, for some time after the war, but it will be in our interest to conclude such agreements with American and European companies as would enable us not only to be linked up with the transatlantic airlines, but also to operate part of the transcontinental air transport system. If you look at the map of Europe and draw a line from Lisbon to Moscow, you will see that the line passes through Czechoslovakia.

Czechoslovakia's Share

Q.: What contribution can Czechoslovakia make towards the development of air transport in Europe? And what are the lessons of the past in this respect?

A.: Czechoslovakia is the cross-roads of Europe. We are making all preparations and mobilising our resources over here so as to be able to build, immediately after the war, in the east and in the west of our country, modern airports suitable for the landing of the heaviest transoceanic aircraft. It will be to our advantage that we shall have mechanics who, during the last five years, have acquired experience and knowledge of the modern aircraft types in Great Britain, the United States and Canada. I am certain that our servicing facilities will be among the best on the European continent. Also, we must not forget that our aircraft industry achieved considerable success before the occupation of our country. If the news which we are receiving from Czechoslovakia is authentic, the Germans have greatly expanded our aircraft industry, and it can be assumed that there will be no shortage of skilled technical personnel after this war. Even if political considerations are not taken into account—although I believe that the errors of the past will not be repeated—the importance of our geographical and technical advantages cannot be overlooked. I should also like to express another hope: If an international air police force is created, I do not think that it should be based on airfields in German territory but in the territories of her neighbours, and here again Czechoslovakia is one of the countries suitable for the building of a certain number of these bases.

Q.: How do you envisage the part Czechoslovakia may play in post-war air transport organisation?

A.: I need not stress the fact that Czechoslovakia has always had a deep understanding of everything that meant the strengthening of international relations. There is no need for me to remind you of the active part played by Czechoslovakia in all international institutions. We shall co-operate in the future with even greater ardour in the building of international relations, and it is understandable that we shall give a hand with the building of the international air organisation. We are busy studying the problems involved and our experts will be able to play their part in the creation of the future international air transport system.

Q.: How will the experience of Czechoslovak pilots gained during the present war affect the revival of Czechoslovakian aviation?

A.: Since 1939 our airmen have passed through Poland, Russia and France, and have played their part in the "Battle of Britain," and you can imagine, therefore, the very varied experience they have gained. Some of them are now employed with the British Air Transport service and have thus become acquainted not only with the most modern types of transport aircraft, but also with the organisation of air transport services here, in the United States and in Canada, from both a commercial and technical point of view. Their experience will be of very great advantage to Czechoslovak aviation after the war.

EUROPEAN AIR TRANSPORT

Q.: Do you consider the shortage of civil aircraft a serious problem, and what would be the most expedient way of solving it?

A.: This is a very delicate question. I have no reason to doubt that the production figures published by the United States are correct. These figures are so gigantic that it can be assumed that it will be possible to satisfy all European requirements from United States sources immediately after the war, even taking into account the continuation of the war in the Far East, and the problems of repatriation. It is not impossible to make now a fairly accurate estimate of the post-war needs of the European countries which, it may be assumed, will not be in disproportion with the reserves held in the United States. The solution to this question will also depend on the good will and international collaboration and elimination of selfishness. Only if an agreement with the U.S.A. could not be achieved would the supply of aircraft present a very serious problem. There is, however, no need to anticipate such a situation.

Use of the equipment of the German *Lufthansa* and air operators of the satellites should be considered only as an emergency measure and would only cover the replacements. In any case, we do not know to-day what will survive the "Furor Teutonicus." It is no exaggeration to say that Europe regards America as the source of supply of civil aircraft. Great Britain has concentrated on the production of combat aircraft. Her decision will not remain unrewarded.

Post-war German Aviation

Q.: What policy should be adopted by the United Nations towards German aviation (in rough outline)?

A.: We all know that the *Lufthansa* is the mother of the *Luftwaffe*. After this war there will be no *Lufthansa*, nor will the satellites have any airlines. This will mean placing under international administration those airports and all the equipment necessary for the maintenance of international air traffic. It will also mean preventing the Germans from engaging—either by means of capital or organised immigration—any air transport outside Germany, e.g., in countries which are now neutral. This will, furthermore, necessitate the closing down of all German sports aero clubs, research stations, laboratories, libraries, and eliminating anything that might be an embryo of a new *Lufthansa* and another *Luftwaffe*. Any air transport inside Germany and her vassal states which will have to be maintained, will have to be managed—for a period after the war which cannot be foreseen at this stage—by an international body in which all the United Nations will participate.

Present Plans

Q.: What discussable plans have been or are being prepared for the revival of civil air transport in Czechoslovakia, and what regional arrangements or contacts (if any) are being envisaged?

A.: We are preparing plans for our future air transport as far as this can be done abroad. We have two air transport companies, both of them co-operating with international organisations which are now being created. We are in favour of an organisation of operators which will be truly world-wide and led in a spirit which would guarantee the post-war stability of air transport. We are not in favour of regional arrangements. If no new solution is found, we should like to return home having concluded agreements with those countries with which we operated before the war, so that we shall not have to go through the preparatory stage in the busy post-war period. We are making plans for our airlines and are preparing a sort of five-years' plan. We are planning our airports so as not to lose much time when hostilities cease. Our main concern is concentrated in procuring aircraft and equipment for the relief and rehabilitation period. We do not want to come home empty handed.

Q.: Since your country was one of the three co-operating before the war with the U.S.S.R. in the field of civil air transport, what are, in your opinion, the prospects and possibilities for a post-war link with that country? Can one expect the U.S.S.R. to take an active part in a post-war international air transport system?

A.: Already in 1935 we concluded a political treaty with the U.S.S.R. The new treaty of December, 1943, means, therefore, the reassurance of our pre-war political conception. Shortly after the conclusion of our treaty of 1935 we opened up air negotiations between Prague and Moscow. I have no doubt that our mission to bridge the east with the west will reaffirm this also in the field of aviation. We have started now to make all preparations for this, and we believe that the government of the U.S.S.R. will fully understand our needs. I do not know Russia's post-war plans for aviation, but I am convinced that a nation which is undergoing so much to save civilisation will also, and with full right, want to play her part in the organisation of peace. As I said before, I can hardly imagine a working international organisation of air transport without the very active participation of the Soviet Union.

OUTPUT OF 100 OCTANE FUEL

MR. RALPH K. DAVIES, Deputy Petroleum Administrator for War, speaking at the dedication of the 100 octane plant of the Republic Oil Refining Company at Texas City, recently said: "In addition to our capacity to produce aviation gasoline within the United States, substantial additional production comes from foreign refineries. In the near future the United Nations will have available to them a capacity to produce 500,000 barrels per day of this special fuel—more than all the oil of all kinds available to Axis Europe. Surely there is comfort for us in these figures.

"In 1941, just prior to Pearl Harbour, the total 100 octane production of the United States was just over 40,000 barrels, or less than 10 per cent. of what it is to-day. In 30 months in this country we have built over 50 plants at a cost of almost $1,000,000,000.

"The daily consumption by ourselves and our Allies for military purposes alone now reaches the staggering figure of over 1,500,000 barrels. This is almost ten times as much as was consumed in the first war. There must be added all that goes to support the war economy and the vital shipping of the United Nations.

"Since both the needs of the war economy at home and those of the battle front are essential to the prosecution of the war, it may properly be said that the total requirements of the United States and her Allies are, in fact, 6,750,000 barrels daily, or 2,500,000,000 barrels per year. It is difficult to visualise any such quantity of oil.

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(*Continued from page 128*)

possible international controls without mentioning the still more far-reaching measure of international operation. Everything that I have said to this point has assumed that international airlines will be privately operated. That certainly is the assumption in the United States; but there have been substantial bodies of opinion in the United Kingdom and elsewhere which have advocated that international airlines be entirely in the hands of international companies or intergovernmental partnerships.

I do not think that there is any substantial body of opinion which considers true internationalisation, with the airlines' personnel employed and their equipment purchased without regard to national origin, as being a practical possibility of the immediate future; but the idea has had the sympathetic attention of some very conservative British journals, as well as of those which might have been expected to welcome it as a step towards a general socialisation of transport and public utilities.

Annular or Tandem?

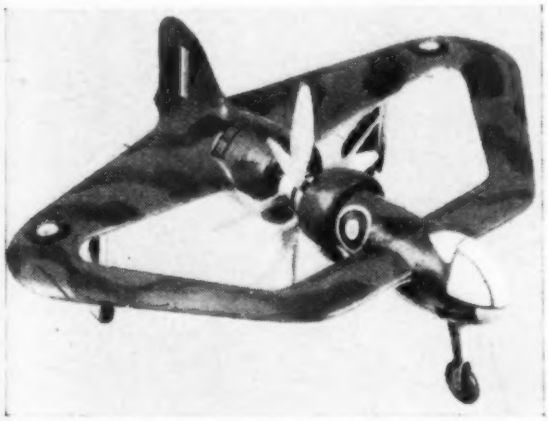
A Fighter Design Project Difficult to Classify : Contra-rotation Without Gears

THROUGHOUT the history of flying there have been restless souls who could not content themselves with following the beaten track. The patent offices of the world have been filled with weird ideas, most of which came to nothing, but a few of which did at least reach the prototype stage. It is perhaps significant that few if any of these "freaks," if one may use the expression without the somewhat sneering significance which it usually bears, ever reached even small-scale production. That is not, in itself, irrefutable evidence that the unorthodox must necessarily be a failure. Perseverance and the growth of knowledge will sometimes turn an initial failure into an ultimate success. The classic example is, of course, the sleeve valve. When this was first suggested and tried it was not a success. But many years later Sir Roy Fedden and the Bristol company made the same basic scheme work. Improved materials and manufacturing techniques turned the scales.

In the field of aircraft design unorthodoxy has usually taken the form of attempts to break away from the now universal tractor monoplane with one or more engines. One of the earliest examples, at least among the few which ever succeeded in reaching the much-coveted stage of "free flight" as we used to call it in those days was the Cedric Lee annular monoplane, for the design of which Mr. George Tilghman Richards was largely responsible. It was practically circular in plan form, with the elevator as an extension at the back. The "F.B.S.," as it was rudely nicknamed (older readers will remember what the letters stand for!) was flown and ultimately crashed by Gordon Bell.

Variations on the same theme have appeared from time to time. There was the ill-fated Willoughby Delta, built shortly before the outbreak of the present war. This was not circular, but there was an open space surrounded by wings, tail booms and tail.

During the war there has been the scheme suggested by Messrs. Warren and Young (*Flight* of November 18th, 1943, and May 18th, 1944) in which the front and rear wings have their tips in common, enclosing between them an open space. The designers of that project regard it as a tandem monoplane, although it might be argued that since there is a lifting surface connecting front and rear wings the layout could also be regarded as a distorted annular arrangement.



This three-quarter front view of the Peel project illustrates the good fighter view for the pilot.

It is to be doubted whether the front wing would have enough lift to raise the nose during the take-off run.

Mr. George Miles (*Flight* of April 27th, 1944) has advocated the tandem monoplane arrangement, and in our issue of May 4th, 1944, we published pictures of his "Libellulas."

Definitely in the class of annular plan forms falls a project sent to us by a private in the army, Mr. Leslie Peel, whose design is shown in model form in the two photographs. The wings do form a ring, although not a circular one. In a covering letter the designer states: "At first I thought of coupling the wings together by ordinary booms, but then I decided that they could be given aerofoil section and made to contribute to the lift." The same thought was in the mind of Mr. Willoughby, although his "side wings" had their leading edges pointing inwards.

Mr. Peel did not start off with the idea of an annular plan form as the reason for his design. What he was really seeking to do was to use two engines and run them in opposite directions so as to do away with torque reaction; at the same time he wanted to give the pilot a good fighter view. The annular plan form worked itself out from those considerations.

Between Two Fires

It may be recalled that one of the Italian Schneider Trophy contestants (it did not actually take part but was held in reserve at Calshot) had two engines spaced out fore and aft, the front one driving a tractor screw and the rear a pusher, with the pilot seated between them. That arrangement gave contra-rotation, but not the unobstructed forward view.

Whether or not it is a good thing to place the two airscrews close together, as in the Peel project, is open to doubt. Presumably the fact that the blades meet at high speed causes a certain amount of flutter; but the same applies to ordinary gear-driven contraprops.

Only wind-tunnel tests could settle the nature of the airflow over the wings, and the choice of wing sections, their merging into each other, and their angles of incidence, might have a profound effect on the behaviour of the machine, so that much development work would be needed before the merits of the design could be assessed. Extensive pressure plotting would be needed to determine the lift distribution for purposes of stressing the wings. Engine cooling might be yet another problem, and it is by no means certain that the placing of the engines in tandem would, as the designer expects, offer lower drag than the more orthodox placing of the engines on the leading edge of a normal wing. The designer visualises the machine as a carrier-borne fighter, owing to its small span.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

DOODLE-BUGS

Definition of a Torpedo

I VENTURE to suggest that it is rather a childish pedantry to call the above an air torpedo. The official name is the flying bomb, which in fact it exactly is.

A torpedo is a thing which is perfectly clearly known to be used for operations in water and consists of a reciprocating engine under the influence of compressed air and propellers operating in opposite directions.

In fact, I have never seen a bomb called an "air torpedo," but frequently an "aerial torpedo." I suggest that, to avoid confusion, you should call the thing by the official name of a flying bomb.

E. N. BRAY.

THE RAILWAYS AND CIVIL AVIATION

Rubber Trade Analogy

I WONDER if your correspondent, Flt. Lt. Cooper, who objects so strongly to the participation of railway companies in air transport, also objects to tyre manufacturers producing excellent hot-water bottles, upholstery and bathing caps? In one case the theme is rubber, in the other it is travel, and in both cases a thorough understanding and long experience of the basic commodity permits successful and economic exploitation of variations on the theme.

The railways have already been engaged in air transport for many years, and are to-day operating what have come to be regarded as essential services. What is more, they are doing it efficiently and economically, in spite of inevitable wartime handicaps, antiquity of equipment, and shortage of staff. According to Flt. Lt. Cooper this well-tried organisation should be debarred from any post-war expansion, if not exterminated altogether, for no better reason than that it is already linked up with another branch of the same science and is therefore in a unique position to provide that indispensable co-ordination of air and surface transport which we hear so much about.

One word of criticism for Mr. J. Elliot's excellent article, "The Case for the Railways," which appeared in *Flight*, June 22nd. He makes no mention of future equipment, but it is to be hoped that the British railways, like the British shipping companies, intend to support the home market.

"MOORHEN."

AIRCRAFT ENGINEERING TRAINING

R.A.F. Course Too Superficial

WITH reference to B. Bernard's letter, in *Flight* of June 29th, attacking the curriculum proposed by the S.B.A.C., I must write in their defence, although I expect they are well able to do that themselves.

I am an ex-R.A.F. Halton apprentice, but have been discharged from the Service for some years now and have been employed by a firm belonging to the S.B.A.C. I am thus able to make comparisons.

My greatest criticism of R.A.F. training is that they teach a smattering of many subjects and never get down thoroughly to one of them. I have been constantly associated with the Service and I am appalled at the general lack of machine shop experience, jig and tool design and first-class workmanship.

By the method suggested by the S.B.A.C., one can foresee some really first-class tradesmen being produced, whereas the R.A.F. at their very best can produce only semi-skilled craftsmen, and I am quite sure that is all Technical Training Command expect to produce. As for theoretical training, I doubt if one in a hundred could calculate the elementaries of flight. This is not an attack on the R.A.F. training but merely seeks to point out how inadequate their training is for producing really good, highly skilled tradesmen.

In conversation with a fitter corporal yesterday he told me he was a Merlin expert, having worked on it for the last three years. He knew the airscrew went round and its general construction, but did not, what I call, understand it.

Bench training is another great weakness; no knowledge of the various correction factors employed—and why no knowledge of Charles' and Boyles' Law, etc.? All this is why I contend that a long training such as proposed by the S.B.A.C., or the original course of three years at Halton, improved in the light of present experience, is most necessary.

The Halton course is very good, but in my view has too lengthy a period given to specific engine construction. I knew the Armstrong Siddeley Jaguar and the Napier Lion in much too much detail when I passed out, but when I left the Service I could not take a rated altitude power curve and had never seen a broaching tool, let alone appreciate the wealth of knowledge in an aircraft engine factory.

F. ASHLEY.

SOUTH AFRICAN ASSOCIATION

For Personnel of No. 42 Air School

IF any of your readers have been members of the permanent staff or pupils at No. 42 Air School, South Africa, they will be interested to hear that a 42 A.S. Post-war Association has recently been formed.

The broad objects of the association are the maintenance of friendship and understanding contracted between R.A.F., S.A.A.F., S.A.W.A.A.F., and other personnel while serving together, and an exchange of ideas and information of mutual interest to Englishmen and South Africans, whose common bond is that they worked in harmony during the war years. An association news sheet and annual dinners held in both countries are also in contemplation.

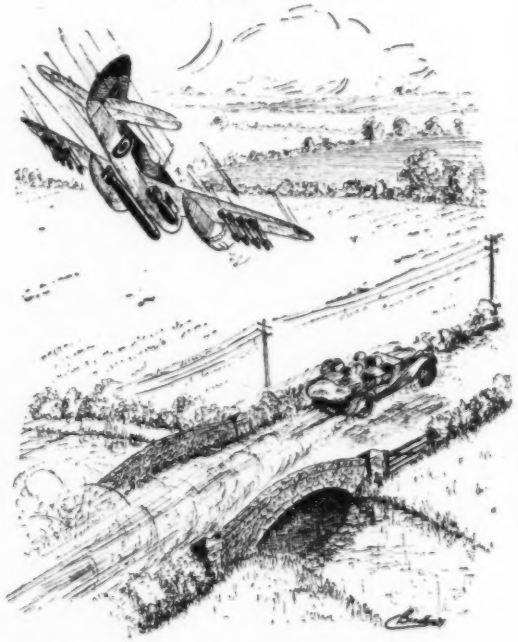
Membership is open to members of the R.A.F., S.A.A.F., S.A.W.A.A.F., European U.D.F. units and Allied personnel who served at No. 42 Air School at any time, whether as permanent staff or pupils.

I shall be glad to give any further information to ex-42-ites who are interested.

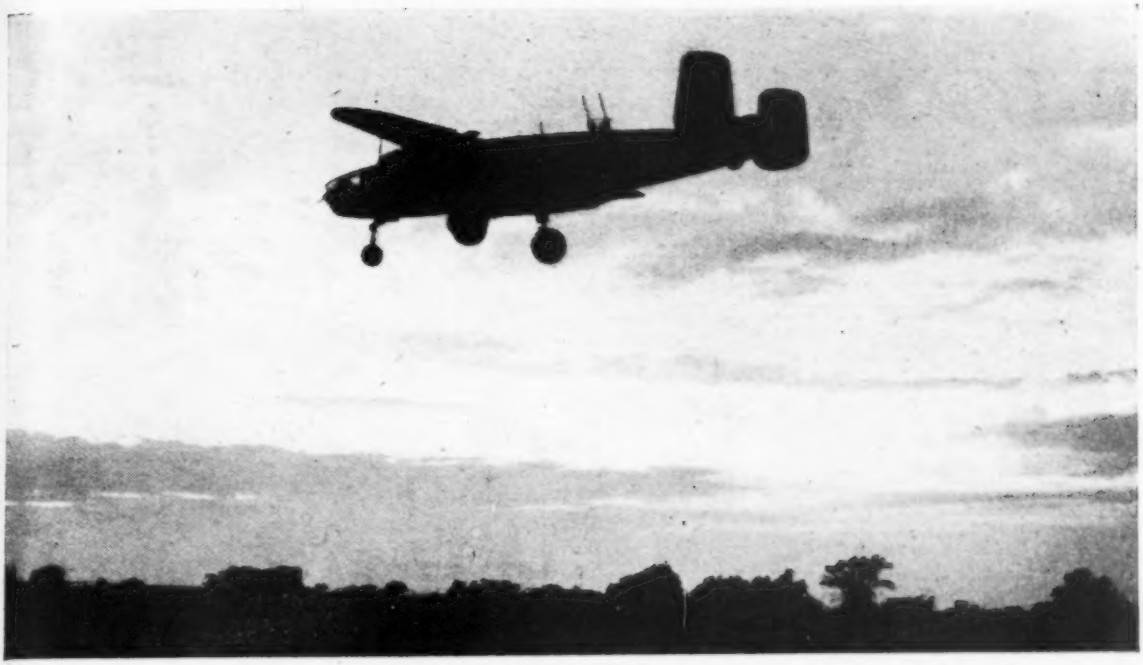
57, Part Street, Southport, Lancs (U.K.).

G. L. HINDLEY, F/O. (Organising Secretary.)

DIVERS WEAPONS



"NOW FOTHERINGAY, WHAT DO YOU SUGGEST? — A FEW POUNDS OF BOSH— A BURST OF CANNON FIRE? — A BUNCH OF ROCKETS? — A BRACE OF HEL? — THE OLD TIN FISH? — OR SHALL WE CALL IT A DAY AND GIVE 'EM THE JACKPOT?"



WHEN DAY IS DONE : A Mitchell coming in to land after an evening attack on a French target.

SERVICE AVIATION

Royal Air Force and Fleet Air Arm News and Announcements

High Command, A.E.A.F.

AIR VICE-MARSHAL J. M. ROBB, C.B.E., D.S.O., D.F.C., A.F.C., R.A.F., has been appointed Deputy Chief of Staff (Air) at Supreme Headquarters, Allied Expeditionary Force.

Air Vice-Marshal Robb was previously serving at Headquarters, Mediterranean Allied Air Force, and earlier was Deputy Air Officer Commanding, N.W. African Air Force. Before then he was on Air Staff duties at Air Headquarters, East Africa (1942), and commanded successively a Bomber and a Coastal Group in the earlier days of the war.

Appointments

AIR VICE-MARSHAL J. B COLE-HAMILTON, C.B., C.B.E., to be Air Officer Commanding a Group of Air Defence of Great Britain.

This officer has been in command of a Group of the A.E.A.F. since February, 1944. He was appointed A.O.C., West Africa, in November, 1943, and was previously A.O.C., Northern Ireland (1941), and in 1940 was A.O.C. of a Training Command Camp.

Act. Air Comdre. R. B. JORDAN, D.F.C., to be Director of Air Transport Policy and Operations at the Air Ministry.

Air Comdre. Jordan was in command of a Squadron when war broke out. In 1940 he was on special duty with the Scottish Command and G.H.Q. Home Forces until appointed Senior Officer Administration of a Group in December of that year. After a spell of flying duties with a Bomber Command Group early in 1941, he was given command of a Bomber Squadron, and later commanded stations before being posted for special duties at the H.Q. of the U.S.S.A.F. early this year.

Air Vice-Marshal G. B. A. BAKER, C.B., C.B.E., M.C., to be Chief of Staff, Mediterranean Allied Air Force.

Air Vice-Marshal Baker has been Air Officer in Charge of Administration Technical Training Command since January 1st, 1943. Soon after the beginning of the war he was appointed senior air staff officer of a Group, later going to the United States on special duty. He was senior air staff officer at Coastal Command before joining Technical Training Command.

Promotions

MEDICAL BRANCH.

Group Capt. (temp. Air Comdre. Act. Air Vice-Marshal) D'A. POWER, M.C., M.R.C.S., L.R.C.P., to be Air Commodore, June 1st, 1944.

Group Capt. (Act. Air Vice-Marshal) A. F. ROOK, O.B.E., F.R.C.P., M.R.C.S., D.P.H., K.H.P., to be Air Commodore (temp.), July 1st, 1944.

Group Captains to be Air Commodores (temp.), July 1st, 1944 :—

T. C. St. C. MORTON, O.B.E., M.D., Ch.B., M.R.C.P., D.P.H., K.H.P.

D. MCLAREN, M.B., Ch.B.

DENTAL BRANCH.

Group Capt. G. A. BALLANTYNE, D.F.C., L.D.S., R.C.S., to be Air Commodore (temp.), July 1st, 1944

H.M. The King decorating Air Comdre. D. F. W. Atcherley, D.F.C., with the D.S.O.

Awards

Fleet Air Arm

THE KING has been graciously pleased to approve the following awards :—

For gallant and distinguished services :—

M.B.E. (Mil.)

Temp. Lt. (A) A. W. J. CAPES, R.N.V.R.

For bravery, leadership, skill and devotion to duty while operating from, or serving in, H.M. Ships *Victorious*, *Furious*, *Emperor*, *Pursuer* and *Searcher* during successful strikes at enemy shipping off the coast of Norway :—

Distinguished Service Cross

Act. Lt. Cdr. (A) P. N. CHARLTON, D.F.C., R.N.
Temp. Lt. (A) A. C. LINDSAY, R.N.V.R.
Temp. Lt. (A) A. R. TOWLSON, R.N.V.R.
Temp. Lt. (A) J. E. ARMITAGE, R.N.Z.N.V.R.
Temp. Sub. Lt. (A) J. M. BOSWELL, R.N.V.R.
Temp. Sub. Lt. (A) D. S. CLARABUT, R.N.V.R.
Temp. Sub. Lt. (A) S. A. ERRATT, R.N.V.R.
Temp. Sub Lt. (A) M. C. FARRER, R.N.Z.N.V.R.
Temp. Sub. Lt. (A) J. A. GLEDHILL, R.N.Z.N.V.R.

Distinguished Service Medal

C. Pet. O. Airman C. TOPLISS.

Royal Air Force

THE KING has been graciously pleased to approve the following award with effect from May 24th, 1944, in recognition of gallantry displayed in flying operations against the enemy in the South West Pacific area :—

Distinguished Service Order

Wing Cdr. W. A. C. DALE, R.A.A.F.

THE KING has been graciously pleased to approve the following awards in recognition of gallantry displayed in flying operations against the enemy :—

Bar to Distinguished Flying Cross

Act. Sqn. Ldr. M. SATTLER, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.—Sqn. Ldr. Sattler has taken part in many operational missions, the majority of which have been directed against major targets in Germany. In attacks on such objectives as Hamburg, Berlin and Cologne, he has proved himself an outstanding pilot. Many of his non operational duty hours have been spent on improving the efficiency of less experienced pilots.

Act. Sqn. Ldr. W. WEISER, D.F.C., R.C.A.F., No. 405 (R.C.A.F.) Sqn.—This officer has completed two tours of operational duties. Most of

SERVICE AVIATION

the sorties completed by him have been accomplished in the face of heavy enemy action over such targets as Berlin, Hamburg and Essen. As a flight commander, Sqn. Ldr. Weiser has displayed skill, courage and devotion to duty of a high order. His enthusiasm and organisational ability have been valuable assets to his squadron.

Act. Flt. Lt. W. R. THOMPSON, D.F.C., R.C.A.F., No. 83 Sqn.—Since the award of the D.F.C., in September, 1943, this officer has continued to operate with outstanding courage and coolness as captain of aircraft. Flt. Lt. Thompson has always displayed fearlessness and a strong sense of duty.

Act. Flt. Lt. D. IBBOTSON, D.F.C., R.A.F.V.R., No. 601 Sqn.—Since the award of the D.F.C., in December, 1942, this officer has continued to take part in operations against the enemy with outstanding courage and determination. His keenness during his first tour of duty was such that his squadron requested his return. Since then he has completed many attacks on locomotives, mechanical transport and petrol dumps. He has destroyed at least 11 enemy aircraft and damaged others.

Flt. Lt. R. E. WAGSTAFF, D.F.C., R.A.F.V.R., No. 70 Sqn.—This officer has continued to give distinguished service as a navigator and bomb aimer since the award of the D.F.C. On two occasions while attacking Naples his aircraft has been illuminated by searchlights and subjected to heavy anti-aircraft fire. Despite this he delayed releasing the bombs till sure that they would fall across the target. Flt. Lt. Wagstaff was responsible, on another occasion, for the accurate navigation of his aircraft in an attack on railway sidings at Foggia rail and sea communications during the Sicilian and Italian campaigns.

Sqn. Ldr. W. H. STRATTON, D.F.C., R.A.F., No. 134 Sqn.—Since being awarded the D.F.C., in 1940, Sqn. Ldr. Stratton has completed many more operational sorties. He has been in command of his squadron since June, 1943, both in the Middle East and India. In the Arakan district, this officer has led many patrols on escort and low level operations. On at least two occasions, by his coolness and initiative, he has led his formation out of danger on the approach of enemy aircraft. An excellent leader and squadron commander, Sqn. Ldr. Stratton has destroyed at least four enemy aircraft.

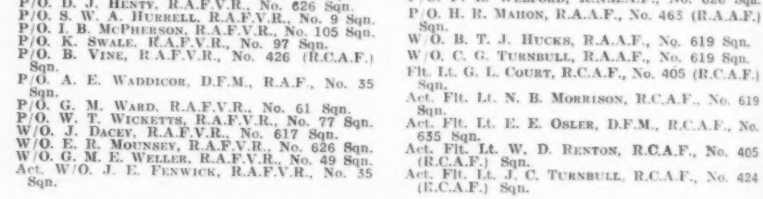
Act. Sqn. Ldr. R. McE. MOTTRAM, D.F.C., R.A.F.V.R., No. 140 Sqn.—Since being awarded the D.F.C., Sqn. Ldr. Mottram has completed further numerous operational sorties. At all times he has displayed outstanding devotion to duty and great courage. His work throughout has been of the highest standard, which has been amply demonstrated by the excellent photographic results he has obtained.

Wing Cdr. K. H. BLAIR, D.F.C., R.A.F.O., No. 613 Sqn.—Since this officer was posted to command his squadron he has taken part in a number of operational sorties. In spite of many difficulties the squadron has achieved a fine record of operations, and this success has been mainly due to the excellent and courageous leadership of Wing Cdr. Blair. His record since the commencement of hostilities has been outstanding and he has destroyed in all twelve enemy aircraft.

Sqn. Ldr. S. C. NORRIS, D.F.C., R.A.F.O., No. 11 Sqn.—Since being awarded the D.F.C., this officer has taken part in many operational sorties, including low level attacks on enemy airfields. He has continued to lead his squadron with skill and determination and has destroyed at least a further four enemy aircraft, bringing his total victories to at least ten enemy aircraft destroyed and others damaged.

Distinguished Flying Cross

Act. Sqn. Ldr. R. A. BENSON, R.A.F.V.R., No. 156 Sqn.
Act. Sqn. Ldr. P. E. BEVINGTON, R.A.F.V.R., No. 199 Sqn.
Act. Sqn. Ldr. J. S. W. BIGNAL, A.F.C., R.A.F.V.R., No. 105 Sqn.
Act. Sqn. Ldr. C. G. LOMAX, R.A.F.V.R., No. 102 Sqn.
Act. Sqn. Ldr. L. W. MILLETT, R.A.F.V.R., No. 105 Sqn.
Act. Sqn. Ldr. R. C. G. ROSEVEAR, D.F.M., R.A.F.V.R., No. 101 Sqn.
Flt. Lt. R. B. CASTLE, R.A.F.V.R., No. 105 Sqn.
Flt. Lt. W. A. DOWNES, R.A.F., No. 138 Sqn.
Flt. Lt. R. A. M. PALMER, R.A.F.V.R., No. 109 Sqn.
Flt. Lt. H. PEAT, R.A.F.V.R., No. 90 Sqn.
Flt. Lt. H. L. PLIMMER, R.A.F., No. 105 Sqn.
Flt. Lt. E. W. F. WALL, R.A.F.V.R., No. 139 Sqn.
Act. Flt. Lt. E. ASHLEY, R.A.F.V.R., No. 138 Sqn.
Act. Flt. Lt. J. BOOTH, R.A.F.V.R., No. 156 Sqn.
Act. Flt. Lt. D. BOWES, R.A.F.V.R., No. 97 Sqn.
Act. Flt. Lt. K. H. H. COOK, R.A.F.V.R., No. 97 Sqn.
Act. Flt. Lt. D. C. W. FORTIER, R.A.F.V.R., No. 103 Sqn.
Act. Flt. Lt. T. J. FUDGE, R.A.F.V.R., No. 78 Sqn.
Act. Flt. Lt. W. J. V. HAMILTON, R.A.F.V.R., No. 49 Sqn.
Act. Flt. Lt. R. MCLEAN, R.A.F.V.R., No. 582 Sqn.
Act. Flt. Lt. G. D. PICK, R.A.F.V.R., No. 138 Sqn.
Act. Flt. Lt. D. ROBERTS, R.A.F.V.R., No. 630 Sqn.
Act. Flt. Lt. S. T. A. ROUSE, R.A.F.V.R., No. 77 Sqn.
Act. Flt. Lt. G. H. RUSSELL-FRY, R.A.F.V.R., No. 103 Sqn.
Act. Flt. Lt. K. D. SMITH, R.A.F.V.R., No. 57 Sqn.
Act. Flt. Lt. D. W. WEBBER, R.A.F.V.R., No. 625 Sqn.
Act. Flt. Lt. K. WOLSTENHOLME, R.A.F.V.R., No. 105 Sqn.
Act. Flt. Lt. A. A. YOUNG, R.A.F.V.R., No. 90 Sqn.
F/O. R. ADAMS, R.A.F.V.R., No. 617 Sqn.
F/O. A. C. BAKER, R.A.F.V.R., No. 44 Sqn.
F/O. J. H. CLAY, R.A.F.V.R., No. 617 Sqn.
F/O. E. COPLAND, R.A.F.V.R., No. 101 Sqn.
F/O. A. H. DEADMAN, R.A.F.V.R., No. 149 Sqn.
F/O. A. J. ENNALS, R.A.F.V.R., No. 434 (R.C.A.F.) Sqn.
F/O. A. A. GREEN, R.A.F.V.R., No. 139 Sqn.
F/O. A. HILL, R.A.F., No. 617 Sqn.
F/O. A. HINDSHAW, R.A.F.V.R., No. 627 Sqn.
F/O. J. J. HUNTER, R.A.F.V.R., No. 105 Sqn.
F/O. E. A. F. JACKMAN, R.A.F.V.R., No. 139 Sqn.
F/O. J. JACKSON, R.A.F.V.R., No. 78 Sqn.
F/O. D. JONES, R.A.F.V.R., No. 49 Sqn.
F/O. W. M. LAWRENCE, R.A.F., No. 431 (R.C.A.F.) Sqn.
F/O. E. G. MCCLORRY, R.A.F.V.R., No. 77 Sqn.
F/O. J. A. MCCLUNE, R.A.F.V.R., No. 427 (R.C.A.F.) Sqn.
F/O. J. MCMASTER, R.A.F.V.R., No. 9 Sqn.
F/O. R. D. MATTOCK, R.A.F.V.R.
F/O. R. H. MAURY, R.A.F.V.R., No. 44 Sqn.
F/O. J. O'LEARY, R.A.F.V.R., No. 106 Sqn.
F/O. P. D. PATERSON, R.A.F.V.R., No. 426 (R.C.A.F.) Sqn.
F/O. R. C. RICE, R.A.F.V.R., No. 576 Sqn.
F/O. H. D. RILEY, R.A.F.V.R., No. 105 Sqn.
F/O. J. ROBERTSON, R.A.F.V.R., No. 149 Sqn.
F/O. W. G. RODGERS, R.A.F.V.R., No. 78 Sqn.
F/O. P. C. SHARP, R.A.F.V.R., No. 550 Sqn.
F/O. D. A. J. SMITH, R.A.F.V.R., No. 138 Sqn.
F/O. B. A. STOKER, R.A.F.V.R., No. 35 Sqn.
F/O. R. H. TREDWIN, R.A.F.V.R., No. 626 Sqn.
F/O. J. TURTON, R.A.F.V.R., No. 149 Sqn.
F/O. K. WAKEHAM, R.A.F.V.R., No. 102 Sqn.
F/O. A. D. WALLIS, R.A.F.V.R., No. 76 Sqn.
F/O. J. S. WATSON, R.A.F.V.R., No. 617 Sqn.
F/O. E. WILLSHER, R.A.F.V.R., No. 617 Sqn.
F/O. A. J. WRIGHT, R.A.F.V.R., No. 630 Sqn.
P/O. H. G. CAPPS, R.A.F.V.R., No. 44 Sqn.
P/O. R. CATTERALL, R.A.F., No. 199 Sqn.
P/O. K. S. DELBRIDGE, R.A.F.V.R., No. 432 (R.C.A.F.) Sqn.
P/O. R. J. DEWEY, R.A.F.V.R., No. 76 Sqn.
P/O. T. C. FORSTER, R.A.F.V.R., No. 103 Sqn.
P/O. F. S. FRANCIS, R.A.F.V.R., No. 76 Sqn.
P/O. D. J. HENTY, R.A.F.V.R., No. 626 Sqn.
P/O. S. W. A. HURRELL, R.A.F.V.R., No. 9 Sqn.
P/O. I. B. MCPHERSON, R.A.F.V.R., No. 105 Sqn.
P/O. K. SWALE, R.A.F.V.R., No. 97 Sqn.
P/O. B. VINE, R.A.F.V.R., No. 426 (R.C.A.F.) Sqn.
P/O. A. E. WADDICOR, D.F.M., R.A.F., No. 35 Sqn.
P/O. G. M. WARD, R.A.F.V.R., No. 61 Sqn.
P/O. W. T. WICKETTS, R.A.F.V.R., No. 77 Sqn.
W/O. J. DACEY, R.A.F.V.R., No. 617 Sqn.
W/O. E. R. MOUNSEY, R.A.F.V.R., No. 626 Sqn.
W/O. G. M. E. WELLER, R.A.F.V.R., No. 49 Sqn.
Act. W/O. J. E. FENWICK, R.A.F.V.R., No. 35 Sqn.
Act. W/O. J. G. MILES, R.A.F.V.R., No. 7 Sqn.
Act. Flt. Lt. J. A. COLPUS, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
Act. Flt. Lt. J. L. V. COMANS, R.A.A.F., No. 97 Sqn.
Act. Flt. Lt. R. J. CONLEY, R.A.A.F., No. 97 Sqn.
Act. Flt. Lt. P. B. JACKSON, D.F.M., R.A.A.F., No. 102 Sqn.
Act. Flt. Lt. M. F. SMITH, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
F/O. G. G. ABBOTT, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
F/O. F. J. NUGENT, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
F/O. R. P. RAMSAY, R.A.A.F., No. 106 Sqn.
F/O. C. R. S. RICKETTS, R.A.A.F., No. 101 Sqn.
P/O. D. A. CHAPPLE, R.A.A.F., No. 90 Sqn.
P/O. J. R. E. HOWELL, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
P/O. A. R. HOYLE, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
P/O. S. A. MOORHOUSE, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
P/O. A. P. SPERLING, R.A.A.F., No. 467 (R.A.A.F.) Sqn.
P/O. R. N. T. WADE, R.A.A.F., No. 460 (R.A.A.F.) Sqn.
Act. Flt. Lt. R. E. MACKETT, R.C.A.F., No. 149 Sqn.
Act. Flt. Lt. H. MCL. SHEARER, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
F/O. A. C. BROOK, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
F/O. K. A. DECHER, R.C.A.F., No. 408 (R.C.A.F.) Sqn.
F/O. T. R. N. DUFF, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
F/O. O. W. FONGER, R.C.A.F., No. 419 (R.C.A.F.) Sqn.
F/O. W. R. MCKINNON, R.C.A.F., No. 102 Sqn.
F/O. W. K. NAYLOR, R.C.A.F., No. 431 (R.C.A.F.) Sqn.
P/O. J. DAVIE, R.C.A.F., No. 429 Sqn.
P/O. J. D. DUNCAN, R.C.A.F., No. 9 Sqn.
P/O. W. H. D. MEADEN, R.C.A.F., No. 432 (R.C.A.F.) Sqn.
P/O. W. PATERSON, R.C.A.F., No. 156 Sqn.
P/O. P. E. PIGEON, R.C.A.F., No. 617 Sqn.
P/O. H. A. WEEKS, R.C.A.F., No. 617 Sqn.
W/O. H. W. DAVY, R.C.A.F., No. 156 Sqn.
W/O. F. R. HAYWARD, R.C.A.F., No. 35 Sqn.
W/O. D. H. KNIGHT, R.C.A.F., No. 550 Sqn.
W/O. J. H. PERRIN, R.C.A.F., No. 103 Sqn.
W/O. B. F. POTHIER, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
Act. Flt. Lt. D. S. P. SMITH, R.N.Z.A.F., No. 207 Sqn.
F/O. B. R. J. HAY, R.N.Z.A.F., No. 139 Sqn.
P/O. D. B. THOMAS, R.N.Z.A.F., No. 90 Sqn.
P/O. F. L. WELFORD, R.N.Z.A.F., No. 626 Sqn.
P/O. H. R. MAHON, R.A.A.F., No. 463 (R.A.A.F.) Sqn.
W/O. B. T. J. HUCKS, R.A.A.F., No. 619 Sqn.
W/O. C. G. TURNBULL, R.A.A.F., No. 619 Sqn.
Flt. Lt. G. L. COURT, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
Act. Flt. Lt. N. B. MORRISON, R.C.A.F., No. 619 Sqn.
Act. Flt. Lt. E. E. OSLER, D.F.M., R.C.A.F., No. 635 Sqn.
Act. Flt. Lt. W. D. RENTON, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
Act. Flt. Lt. J. C. TURNBULL, R.C.A.F., No. 424 (R.C.A.F.) Sqn.



PIN-POINT ATTACK: The crews of three Mosquitoes which made an attack on a three-storey building believed to be a German H.Q., near Vannes, in North-West France.

NEARLY THERE : Rows of 1,000-lb. bombs at an R.A.F. ammunition dump in Normandy. Absence of camouflage emphasises the impotence of the *Luftwaffe*.

F/O. J. C. GIBBS, R.C.A.F., No. 405 (R.C.A.F.) Sqn.
F/O. P. H. TAYLOR, R.C.A.F., No. 619 Sqn.
P/O. P. R. GALAN, R.C.A.F., No. 51 Sqn.
P/O. E. GARGETT, R.C.A.F., No. 429 Sqn.
P/O. V. C. HICKS, R.C.A.F., No. 640 Sqn.
P/O. J. P. HIND, R.C.A.F., No. 619 Sqn.
P/O. J. I. JOHNSTON, R.C.A.F., No. 619 Sqn.
P/O. J. D. ROUTLEDGE, R.C.A.F., No. 405 (R.C.A.F.) Sqn.

Distinguished Flying Medal

Flt. Sgt. F. E. APPLEBY, R.A.F., No. 617 Sqn.
Flt. Sgt. F. H. BARNES, R.A.F.V.R., No. 44 Sqn.
Flt. Sgt. (now W/O.) L. EATON, R.A.F.V.R., No. 617 Sqn.
Flt. Sgt. (now W/O.) R. J. HENDERSON, R.A.F., No. 617 Sqn.
Flt. Sgt. W. HOWARTH, R.A.F.V.R., No. 617 Sqn.
Flt. Sgt. G. J. E. JENNINGS, R.A.F.V.R., No. 76 Sqn.
Flt. Sgt. R. F. LAWRENSON, R.A.F.V.R., No. 106 Sqn.
Flt. Sgt. L. MCCLELLAN, R.A.F.V.R., No. 617 Sqn.
Flt. Sgt. G. NOBLE, R.A.F.V.R., No. 467 (R.A.A.F.) Sqn.
Flt. Sgt. T. J. PAGE, R.A.F.V.R., No. 49 Sqn.
Flt. Sgt. T. H. SAVAGE, R.A.F.V.R., No. 630 Sqn.
Flt. Sgt. C. B. SCOTT, R.A.F.V.R., No. 101 Sqn.
Flt. Sgt. M. M. SCOTT, R.A.F.V.R., No. 44 Sqn.
Flt. Sgt. H. P. SMITH, R.A.F.V.R., No. 9 Sqn.
Flt. Sgt. C. WILCE, R.A.F.V.R., No. 61 Sqn.
Flt. Sgt. W. WILLETTS, R.A.F.V.R., No. 51 Sqn.
Sgt. J. ELEY, R.A.F.V.R., No. 460 (R.A.A.F.) Sqn.
Sgt. E. HEDLEY, R.A.F.V.R., No. 44 Sqn.
Sgt. J. A. KERWAN, R.A.F.V.R., No. 49 Sqn.
Sgt. J. G. LANCASTER, R.A.F.V.R., No. 106 Sqn.
Sgt. J. T. MCQUILLAN, R.A.F., No. 61 Sqn.
Sgt. W. M. RUNDLE, R.A.F.V.R., No. 50 Sqn.
Sgt. J. C. THOMPSON, R.A.F.V.R., No. 44 Sqn.
Sgt. R. H. TURRELL, R.A.F.V.R., No. 44 Sqn.
Sgt. T. M. WILLETT, R.A.F.V.R., No. 44 Sqn.
Flt. Sgt. (now P/O.) E. CLODE, R.N.Z.A.F., No. 106 Sqn.
Flt. Sgt. G. KING, R.A.F.V.R., No. 35 Sqn.
Flt. Sgt. G. A. LEONARD, R.A.F.V.R., No. 97 Sqn.
Flt. Sgt. F. J. LITTLEJOHNS, R.A.F.V.R., No. 51 Sqn.
Flt. Sgt. H. G. LOMAS, R.A.F.V.R., No. 9 Sqn.
Flt. Sgt. F. LOMAX, R.A.F.V.R., No. 9 Sqn.
Flt. Sgt. H. MARSHALL, R.A.F.V.R., No. 429 Sqn.
Flt. Sgt. L. E. G. MIDDLETON, R.A.F.V.R., No. 432 (R.C.A.F.) Sqn.
Flt. Sgt. MILROY, R.A.F.V.R., No. 51 Sqn.
Flt. Sgt. F. MYCOE, R.A.F.V.R., No. 106 Sqn.
Flt. Sgt. D. G. PARTOS, R.A.F.V.R., No. 97 Sqn.
Flt. Sgt. V. F. PITCHER, R.A.F.V.R., No. 49 Sqn.
Flt. Sgt. J. RYAN, R.A.F.V.R., No. 9 Sqn.
Flt. Sgt. A. SIMPSON, R.A.F.V.R., No. 7 Sqn.
Flt. Sgt. A. D. F. SPRUCE, R.A.F.V.R., No. 50 Sqn.
Flt. Sgt. W. TWORT, R.A.F.V.R., No. 51 Sqn.
Flt. Sgt. D. A. WEST, R.A.F.V.R., No. 429 Sqn.
Sgt. S. L. COLE, R.A.F.V.R., No. 166 Sqn.
Sgt. F. G. DOWLING, R.A.F.V.R., No. 807 Sqn.
Sgt. W. G. E. GRIFFITHS, R.A.F.V.R., No. 640 Sqn.
Sgt. M. H. G. KING, R.A.F.V.R., No. 619 Sqn.

THE KING has been graciously pleased, on the advice of His Majesty's Canadian Ministers, to approve the following awards :—

M.B.E. (Mil.)

F/O. R. F. MCLEAN, R.C.A.F.

B.E.M. (Mil.)

LA/C. N. F. WOLGASI, R.A.A.F.

Roll of Honour

Casualty Communiqué No. 409.

THE Air Ministry regrets to announce the following casualties on various dates. The next of kin have been informed. Casualties "in action" are due to flying operations against the enemy; "on active service" includes ground casualties due to enemy action, non-operational flying casualties, fatal accidents and natural deaths.

Of the names in this list, 106 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. F. Banks; Sgt. J. Green; Sgt. B. A. Lincoln; Flt. Lt. W. R. B. McMurray; Sgt. A. A. Milligan; F/O. W. E. B. Silva-White; Flt. Sgt. J. Towers.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. R. C. Bradley; Sgt. J. L. Radmore; Flt. Sgt. R. W. Staveley.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Act. Flt. Lt. C. H. Abbott; Sgt. F. Abell; F/O. P. Anderson; P/O. R. F. G. Barker; Sgt. T. B. Barrie; Flt. Sgt. A. L. Butler; Sgt. J. Curran; Flt. Sgt. L. A. Davies; F/O. L. G. Davies; Sgt. E. G. H. Day; Act. Wing Cdr. R. G. England, D.F.C.; Sgt. J. E. Farmer; F/O. R. E. Favier; Sgt. S. T. Flatman; Sgt. W. A. Gilbert; Sgt. T. G. Goodwin; P/O. S. Greenlees; Sgt. A. W. Hallworth; P/O. J. W. Hardcastle; Act. Flt. Lt. J. R. Hastings; Flt. Sgt. F. P. Hill; Sgt. B. A. C. Hunt; Sgt. L. Ivory; P/O. E. L. Jackson; Sgt. G. E. Kane; P/O. A. E. Kindell, D.F.M.; Sgt. W. A. King; P/O. J. E. Kirkup; P/O. R. D. Large; P/O. T. D. L. Leslie; Flt Sgt. W. R. Lewis; Sgt. A. R. Line; Sgt. L. F. McDermott; Sgt. D. W. MacDonald; Sqn. Ldr. A. L. McDowell; Sgt W. C. McGartney; Sgt. J. A. MacNish-Porter; P/O. H. R. Madgett; Sgt. R. Major; P/O. E. G. J. Marsh; Sgt. C. G. R. Moll; Sgt. E. M. Morgans; P/O. H. G. P. Mounsey; Sgt. W. E. Mussen; F/O. W. S. Neathway; P/O. S. G. Palk; Sgt. L. A. Price; W/O. J. R. Prockter; Sgt. G. F. Pyott; Sgt. D. B. Richardson; Flt. Sgt. G. A. Ridge; P/O. H. Robinson; Flt. Sgt W. H. Robjohns; Sgt. E. Robson; Act. Flt. Lt. D. R. Rogers; Sgt. J. W. Satchell; Sgt. K. Saunders; Sgt. D. W. Savoy; Act. Sqn. Ldr. G. A. Sells, D.F.C.; P/O. G. Simpson; Sgt. D. Smith; Sgt. V. Smith; Sgt. W. J. R. Soulsby; P/O. A. W. A. Souter; F/O. P. J. Sparkes; Sgt. E. T. Springett; Sgt. H. A. Stanworth; Sgt. J. A. Stewart; Sgt. A. Stuart; F/O. J. W. Sturdy; Sgt. A. S. Taylor; Flt Lt. A. M. Todd; Sgt. R. E. Tomlin; P/O. R. V. Turner; F/O. J. N. Ure; Sgt. N. R. Waite; P/O. J. J. Wakefield; Sgt. T. N. Weston; Sgt. R. Williams; Sgt. T. J. Wilson; Sgt. D. A. Young.

WOUNDED OR INJURED IN ACTION.—Sgt. W. J. Wickens.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—F/O. J. E. Emery.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Sgt. G. P. Davies; Flt. Sgt. I. A. W. Gilmore; Flt. Lt. D. C. Ross; Flt. Lt. A. S. Williams.

MISSING.—Sgt. J. E. Adams; Sgt. W. E. Alexander; F/O. E. R. Alston; F/O. J. A. Armour, D.F.C., D.F.M.; Sgt. A. L. A. Ash-Smith; Flt. Sgt. A. Baker; Sgt. D. A. Barber; P/O. C. A. Bartlett; Sgt. T. E. E. Benjamin; Sgt. T. Blacklock; Flt. Sgt. J. E. Brandon; F/O. I. MacK. Bremner; P/O. J. Broomfield; F/O. D. Brown, D.F.C.; Flt. Sgt. E. Brunt; F/O. H. C. Bryant, D.F.C.; F/O. A. F. Bryce; Sgt. F. J. Burton; P/O. G. Cable, D.F.M.; Sgt. J. W. Carter; F/O. R. D. Carter; Sgt. D. G. Champkin; P/O. D. J. Chase; Sgt. S. J. Clayton; Flt. Sgt. F. C. Coker; Flt. Sgt. R. S. Cole; Sgt. H. W. Collins; F/O. J. A. Collis; Sgt. A. F. Curran; Flt. Lt. R. J. Curtis, D.F.M.; Sgt. J. McD. Davies; Sgt. F. L. Dawson; P/O. T. J. Drew; Sgt. C. G. Dudley; Sgt. S. P. Dullaghan; Sgt. J. A. Durkin; P/O. R. Earnshaw; Sgt. J. W. Firth; P/O. F. S. Folley; Act. Sqn. Ldr. J. C. N. Forshaw; Sgt. M. Fowler; Flt. Sgt. E. C. Fry; Sgt. R. C. Gardner; Sgt. A. J. Gill; Sgt. E. Gledhill; Sgt. D. W. Golding; Sgt. J. Gommo; Sgt. J. R. Grantham; Flt. Sgt. A. W. Green; Flt. Sgt. B. G. Green; Sgt. S. S. J. Haines; W/O. R. F. J. C. Hall; Sgt. C. A. Hargood; Sgt. K. A. Harper; Flt Sgt. G. A. Hassett; F/O. E. G. Hawkins; Sgt. H. S. Hayward; Sgt. C. A. Hensey; F/O. A. G. Heron; P/O. G. A. J. Horton; Sgt. K. W. P. Hunt; Sgt. D. Jones; F/O. P. C. Jones; Sgt. R. C. H. Jones; P/O. T. G. Jones; F/O. W. L. W. Jones; Flt. Sgt D. W. A. Kersey; Sgt. J. R. Lees; F/O. J. J. G. Lewis; Flt. Sgt. J. H. B. Lister; Sgt. V. Lodge; P/O. M. F. Lombard; Flt. Sgt. R. A. F. Lorretan; Sgt. G. Lyall; Sgt. J. P. McGinn; F/O. B. P. McGonagle; Sgt. K. McKenzie; Sgt. T. J. McVittie; Flt. Sgt. W. Mabon; Flt. Sgt. E. F. Maidment; Sgt. S. F. Martin; F/O. L. G. Matthews; Sgt. H. N. Merrion; F/O. M. L. Morgan-Owen; Sgt. G. C. Munton; F/O. N. E. S. Mutter; P/O. D. H. Nelson; P/O. C. W. J. Newman; Sgt. J. Nicholls; Flt. Sgt. E. J. Outram; Sgt J. G. Pettifer; P/O. E. N. Powell; Flt. Sgt H. G. Pratt; Sgt. W. A. Pullen; P/O R. B. Pullin; Flt. Sgt. C. Rattner; P/O. J. Riordan; Sgt. S. J. Rodway; Act. Wing Cdr. W. McF. Russell; Sgt. H. Sadler; Sgt. R. J. Sampson; P/O. D. Schofield, D.F.M.; F/O. N. Simister, D.F.M.; Sgt. B. H. Smith; P/O. S. Sparkes; F/O. W. A. F. Squibb; Sgt. P. T. Stevens; Sgt. H. Stewart; P/O. R. H. Stewart; Sgt. J. A. Sturgeon; Sgt. E. G. Swallow; P/O. W. J. Tay; Sgt. R. A. Taylor; Sgt. A. D. Tetley; Sgt. R. J. Thompson; Sgt. F. L. Tucker; Flt. Sgt. F. T. Tyler; Flt. Sgt. W. R. Walker; Sgt. F. G. Walter; Wing Cdr. A. Warburton, D.S.O., D.F.C.; Act Flt. Lt. K. R. Waugh; Sgt. W. A. Webb; Sgt C. F. Weir; Sgt. B. D. West; F/O. R. C. Wickens; Sgt. M. F. Williams; Sgt. R. G. Williams; Sgt H. F. Wilson; Flt. Sgt. R. Withinshaw; Sgt K. G. Wooden; Sgt. F. E. Woods.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Sgt. D. L. Brett; F/O. M. Broadhurst; Flt. Sgt. C. R. Johnson; Flt. Lt. R. H. Woodward.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. A. G. Brown; Sgt. J. J. Bruce; Flt. Sgt. F. A. Burroughs; Sgt. J. H. Camp; Sgt. C. W. Cooch; Flt. Sgt. E. Deans; F/O. J. C. Ford; P/O. J. M. P. Frame; L.A/C. W. S. Hall; Flt. Sgt. J. L. T. Hinchcliffe; Flt. Lt. T. L. Hogg; A/C.2 D. Holland; A/C.2 R. A. Killman; Sgt. S. G. Kingsmill; F/O. R. G. Kirby; A/C.2 W. A. Knowles; Sgt. C. H. Le Brun; Sgt. A. Lister; Cpl. J. MacDonald, L.A/C. G. W. Martin; Flt. Sgt. D. G. Matthews; Flt. Sgt. D. J. Mayhew; Flt. Lt. J. L. Milne; Sgt. R. B. Mitchell; Sgt. S. T. Murphy; L.A/C. S. Mynett; Flt. Sgt. M. L. Quadry; Sgt. P. G. O. Reynolds; Sgt. E. G. Rowe; Cpl. S. C. Sharp; Flt. Sgt. L. C. Simmons; W/O. K. Spencer; Flt. Lt. R. Thomson; Sgt. F. E. W. Veal; Flt. Sgt R. R. Wilkinson; Flt. Lt. R. Woodhouse; Sgt. C. Woolfenden; Sgt. W. H. Young.

WOUNDED OR INJURED ON ACTIVE SERVICE.—L.A/C. W. J. Webb.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—L.A/C. E. Moore.

DIED ON ACTIVE SERVICE.—L.A/C. D. D. Allston; L.A/C. A. Allonby; Cpl. A. C. S. Clark; Cpl. C. E. Coston; W/O. J. Elsdon-Howard; A/C.1 A. C. R. Fowler; Sgt. E. O. Goulden, M.C.; L.A/C. W. G. House; Flt. Lt. G. R. Knight; L.A/C. A. J. Lane; Sqn. Ldr. E. W. Lawrence; L.A/C. J. Murphy; L.A/C. F. G. Parker; Wing Cdr. G. W. Paton; F/O. E. Proctor; Cpl. C. L. Ryan; Flt. Lt. F. G. Turner.

Royal Australian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. P. Panos.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—P/O. H. W. G. Cockren; P/O. J. E. Hay.

MISSING, BELIEVED KILLED IN ACTION.—Act. Flt Lt. C. C. Kissner.

MISSING.—F/O. M. W. Carroll; Flt. Lt. N. S. Eliot; F/O. H. R. Harrison; F/O. F. G. Jackson, D.F.C.; F/O. G. A. Jacobson; Act. Sqn. Ldr. E. G. D. Jarman, D.F.C.; Flt. Sgt. K. J. O'N. Lynch; F/O. T. J. Lynch; Flt. Sgt. D. J. MacKenzie; Flt. Sgt. J. A. Murphy; F/O. R. L. Neal; F/O. R. M. J. Pahlow; W/O. D. F. Phillips; F/O. F. M. Silva; F/O. A. C. Swan; W/O. A. E. Thomas; Flt. Sgt. G. T. Wilks; Flt. Sgt. G. W. Woodd.

KILLED ON ACTIVE SERVICE.—P/O. P. J. Blumer; W/O. K. Dear.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED ON ACTIVE SERVICE, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Flt. Sgt. W. R. G. Anderson.

WOUNDED OR INJURED ON ACTIVE SERVICE.—F/O. J. F. Olver.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—Flt. Sgt. I. C. Cormack.

Royal Canadian Air Force

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. L. H. York.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—F/O. R. J. Burke; P/O. J. L. Drysdale; W/O. L. P. Edwards; Sgt.

SERVICE AVIATION

B. L. Haley; Sgt. J. H. Johnston; P/O. C. A. MacDougall; F/O. G. S. Malton; Flt. Sgt. W. C. Moran; W/O. F. O. Turner.

WOUNDED OR INJURED IN ACTION.—W.O. R. L. Edmonds.

KILLED ON ACTIVE SERVICE.—F/O. G. D. Beatty.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—P/O. F. A. Duquette.

WOUNDED OR INJURED ON ACTIVE SERVICE.—F/O. R. H. Kistner.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. F. N. Bowler; Flt. Sgt. J. P. Donnelly; F/O. J. Goulding; F/O. N. R. S. Humphreys; W/O. H. S. Shepherd; Flt. Sgt. N. N. Wakely; Flt. Sgt. A. E. Watson.

WOUNDED OR INJURED IN ACTION.—P/O. R. J. Street.

MISSING.—P/O. H. E. Billens; Flt. Sgt. H. R. Falloon; Flt. Sgt. G. E. Longley; Flt. Sgt. T. A. Peevers; Act. Sqn. Ldr. E. W. Sachtler; P/O. B. F. Wallis.

KILLED ON ACTIVE SERVICE.—F/O. C. W. Abbott; F/O. I. C. Bennington; Flt. Sgt. A. L. B. Carson; Flt. Sgt. T. L. Gardiner; Sgt. R. Gilmore; Sgt. L. E. Laird; Flt. Lt. C. Todd.

South African Air Force

KILLED IN ACTION.—2/Lt. A. D. Mussey; 2/Lt. D. Webster.

WOUNDED OR INJURED IN ACTION.—W/O. T. E. Johnson; W/O. H. F. McCabe.

MISSING, BELIEVED KILLED IN ACTION.—2/Lt. W. W. S. Facer; Lt. W. E. Foster.

MISSING.—Lt. A. E. Wallem.

Casualty Communique No. 410

Of the names in this list 95 are second entries giving later information of casualties published in earlier lists.

Royal Air Force

KILLED IN ACTION.—Sgt. H. T. Alpe; P/O. T. E. Astbury; Sgt. G. E. Bailey; Flt. Sgt. J. R. Bathe; Sgt. D. H. Beechey; Sgt. A. Bennett; P/O. J. Birnie; W/O. T. R. Broadbent; Sgt. W. E. Crawford; Sgt. J. G. Davenport; P/O. D. R. Dibbins; Sgt. J. Ferguson; Sgt. W. B. Graham; Sgt. N. M. Harrison; Sgt. G. J. Head; Flt. Sgt. E. J. Hodges; Flt. Sgt. D. Hopkins; Sgt. E. F. Hopkins; Sgt. G. E. Jeeves; Sgt. A. Jervis; Flt. Sgt. D. L. Jones; Sgt. E. Kerwin; Sgt. D. A. W. Leftly; Sgt. R. E. Lodge; Act. Wing Cdr. R. Marples, D.F.C.; Flt. Sgt. R. A. Mercer; Sgt. K. C. Oswald; Wing Cdr. R. M. Outfin; Sgt. C. J. Page; Sgt. N. D. Rixson; Sgt. C. Whittle; Sgt. C. Williams.

PREVIOUSLY REPORTED MISSING, BELIEVED KILLED IN ACTION, NOW PRESUMED KILLED IN ACTION.—F/O. W. B. G. Bonsey; Sgt. J. Bowyer; Flt. Sgt. W. J. Bunting; F/O. R. T. Chinery; F/O. A. G. Davies; W/O. W. A. Jeffries; Act. Sqn. Ldr. R. A. Ullman.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Sgt. F. K. Alcock; P/O. V. R. Baker; F/O. C. L. Barbezat; Flt. Sgt. R. J. H. Barren; Sgt. S. G. Bond; Sgt. P. L. Buck; Sgt. G. C. Burton; W/O. R. R. Burton; Flt. Sgt. D. E. M. Carson; Sgt. J. H. Connel; Sgt. J. Cooper; Sgt. A. Cox; Sgt. S. G. Coyne; P/O. V. Creswell; Sgt. F. P. Davis; Sgt. R. D. Deugard; P/O. R. J. R. Docker; Sgt. J. W. D. Fletcher; Sgt. E. G. Francis; Sgt. D. A. Galloway; Sgt. J. K. Gilvary; Sgt. D. Goulden; F/O. R. W. Griffiths; Sgt. P. Groom; Sgt. S. B. Harris; F/O. E. C. Hart; Sgt. J. J. V. Heal; Sgt. D. R. Hempstock; Sgt. D. A. Hewitt; Sgt. R. Hill; Flt. Sgt. P. J. Horsham; Sgt. R. J. Howell; Sgt. H. J. Hudson; Sgt. W. R. Huntley; Sgt. J. A. Irving; Sgt. S. W. James; Sgt. J. H. C. Kilpatrick; Sgt. R. Laughton; P/O. A. Lens; Sgt. E. Lewis; P/O. A. J. E. Long; Sgt. L. Lucas; Wing Cdr. I. J. McGhie; Sgt. M. Meakin; P/O. H. W. Milligan; F/O. N. S. Mitchell; Sgt. W. A. Mitchell; Sgt. G. C. Mutch; Sgt. R. E. Newman; Flt. Sgt. J. F. Nichols; Sgt. J. E. Nicholson; Sgt. H. Nuttall; Sgt. A. Ord; P/O. A. J. Pearce; Flt. Sgt. H. J. Pratt; Sgt. H. Price; Flt. Sgt. V. E. Scuse; Sgt. L. H. Sefton; Sgt. W. Sheffield; Sgt. A. R. Slaney; Sgt. S. J. Smith; F/O. A. H. J. Sumner; Sgt. R. H. Tozer; Sgt. L. M. Trimmer; Act. Flt. Lt. M. J. A. White; Sgt. A. Whitwam; Sgt. G. W. Wilson; Sgt. G. Wright.

WOUNDED OR INJURED IN ACTION.—Flt. Sgt. J. Anderson; Sgt. L. E. Westbrook; Sgt. A. H. G. Wright.

DIED OF WOUNDS OR INJURIES RECEIVED IN ACTION.—Sgt. J. McNeil; Sgt. T. Nainby.

MISSING, BELIEVED KILLED IN ACTION.—Flt. Lt. A. S. Boyes; Sgt. W. Docherty; Sgt. S. Grove; Flt. Sgt. H. R. Poole; Sgt. G. Pound; Act. Sqn. Ldr. S. A. Somerscales, D.F.C.; Sgt. W. H. Whitehall; Flt. Sgt. D. H. Williams.

MISSING.—F/O. L. H. Abbott; Flt. Sgt. R. J. E. Adey; Flt. Sgt. L. D. Anderson; F/O. R. L. Archer; Flt. Sgt. F. B. Baker; Sgt. J. F. Barron; Sgt. A. Beattie; Flt. Sgt. P. A. Bennett; Act. Flt. Lt. A. Boswell; Flt. Lt. F. N. Boulton; Sgt. O. McD. Brown; Sgt. J. F. Brunton; Sgt. R. W. Burgess; Flt. Lt. F. M. Burton; F/O. G. Buxton; P/O. R. R. Cagienard; Sgt. H. D. Clark; Act. Sqn. Ldr. A. L. Collett, A.F.C.; Sgt. D. N. Collins; Flt. Sgt. R. G. Craddock; F/O. A. D. Critchlow; Flt. Sgt. R. H. Crystal; F/O. J. W. C. Darvall; Flt. Sgt. G. H. Davies; Flt. Sgt. J. L. Davison; Flt. Sgt. E. C. Doram; Sgt. S. N. Dougan; Sgt. J. Doyle; Sgt. F. J. Edwards; F/O. K. K. Edwards; Sgt. J. N. Elliott; Flt. Sgt. W. F. Evans; Flt. Sgt. E. G. M. Eyres; Sgt. S. Fawcett; Sgt. E. Fletcher; Sgt. N. L. Forth; Flt. Sgt. F. A. Foster; Flt. Sgt. H. W. Fox; F/O. R. Frazer; Sgt. G. F. French; Flt. Sgt. A. McP. Geddes; Flt. Sgt. E. W. Greenwood; F/O. T. D. Halbert; F/O. G. J. Harden, D.F.C.; Sgt. E. A. Hatch; Flt. Sgt. J. Heyes; Flt. Sgt. F. J. N. Hickson; Sgt. J. G. Hodge; Sgt. A. Holt; Sgt. R. J. Humbles; Sgt. R. Hyde; Sgt. L. G. A. Izod; Sgt. E. Jeal; Sgt. W. H. Jenkins; Sgt. H. C. M. Kahler; Flt. Lt. A. G. R. Kayll; Sgt. C. P. Kelly; P/O. W. H. Kent; P/O. J. S. Kilgour; Sgt. B. M. Kimber; Sgt. F. C. Kimber; Sgt. F. D. King; F/O. J. H. Lewis; Sgt. G. S. Longmate; Sgt. D. A. Loveday; Sgt. A. McCluskie; Flt. Lt. A. M. McEwan; Sgt. W. McKelvie; Sgt. J. H. McVey; Sgt. J. D. Manley; F/O. H. Mason, D.F.M.; Sgt. R. Middleton; F/O. D. J. Moore; Sgt. L. Morgan; Act. Flt. Lt. J. F. Muir; Flt. Sgt. F. H. Nopper; Sgt. G. J. Patterson; Sgt. R. L. M. Peirce; F/O. J. B. G. Pezaro; Flt. Sgt. K. J. Pinnell; Sgt. J. F. Plummer; F/O. J. H. Reavill, D.F.M.; F/O. A. H. Redman; P/O H. G. P. Reed; Sgt. J. H. Rees; Sgt. L. G. Reilly; Sgt. R. A. K. Riddle; Flt. Lt. G. Roberts; Flt. Sgt. F. Salmond; Sgt. W. Shorten; Sgt. A. B. H. Sims; Sgt. F. Skelly; Sgt. E. S. Sowersby; F/O. R. Stakes; Sgt. G. N. Tebbutt; Sgt. W. Upsall; Sgt. A. W. Wade; Sgt. C. Waller; Sgt. J. R. V. Walton; F/O. G. Watson; Sgt. M. White; Sgt. W. Wigham; Sgt. A. W. Wilkinson; Act. Flt. Lt. D. L. Williams, D.F.C.; Sgt. J. Wilson; F/O. S. T. Wingham; Flt. Lt. E. W. Wiseman; Sgt. P. Woollam; W/O. H. H. Wright.

KILLED ON ACTIVE SERVICE.—F/O. A. R. Allan; Flt. Lt. L. J. Banks; L.A/C. T. Beveridge; A/C.2 R. R. Carr; Flt. Sgt. J. D. Clark; Flt. Sgt. L. N. Clark; Sgt. T. R. Evans; A/C.2 D. J. Fazakarley; W/O. R. C. Glew, D.F.M.; Act. Flt. Lt. F. A. C. Goodwin; F/O. O. L. Harrington; Flt. Sgt. I. Jones; Flt. Sgt. F. E. Moody; L.A/C. W. Myers; A/C.2 A. Paton; Flt. Sgt. H. J. Ralph; F/O. G. Turton.

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED ON ACTIVE SERVICE.—Sgt. S. A. Bertie; Cpl. W. Friend; Sgt. C. McGinnity; Sgt. F. Meaker; P/O. F. Saunders; Sgt. J. S. Webb.

PREVIOUSLY REPORTED MISSING, NOW REPORTED KILLED ON ACTIVE SERVICE.—A/C.1 W. Bailey.

WOUNDED OR INJURED ON ACTIVE SERVICE.—W/O. N. D. Batstone; Sgt. P. A. Beart; Sgt. W. T. Burton; L.A/C. A. V. R. Stocker.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—L.A/C. J. L. Matthews; Sgt. F. R. Tearle.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Lt. R. I. Johnson.

DIED ON ACTIVE SERVICE.—L.A/C. A. M. Strathdee; L.A/C. D. W. Williams.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—Sgt. D. L. F. Bellamy; P/O. J. Berger; F/O. R. R. Brown; Sgt. R. T. Cox; Sgt. J. K. English; W/O. J. W. Gregory; Act. Flt. Sgt. C. Rogers; Sgt. R. L. Smith.

Royal Australian Air Force

KILLED IN ACTION.—Flt. Sgt. A. Hogg.

MISSING.—Flt. Sgt. J. A. Alexander; Flt. Sgt. M. Box; F/O. A. E. Buckley; P/O. W. F. Collins; F/O. A. D. Hoffman; W/O. J. A. Leaver; Flt. Sgt. P. M. Moloney; F/O. D. E. Tolley.

MISSING, BELIEVED KILLED ON ACTIVE SERVICE.—Flt. Sgt. R. J. Tudehope; Flt. Sgt. S. J. H. Young.

KILLED ON ACTIVE SERVICE.—Flt. Sgt. R. R. Skipsey.

PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. L. R. Boag.

Royal Canadian Air Force

KILLED IN ACTION.—P/O. J. P. Cosgrove; W/O. A. Feldman; Sgt. W. J. MacMillan; P/O. A. M. Minard.

MISSING, BELIEVED KILLED IN ACTION.—Sgt. L. J. Boudreau; Flt. Sgt. R. S. Chapman; F/O. D. A. Crosbie; P/O. W. P. Hugli; Sgt. G. W. Mayor; Sgt. L. M. Meyer; F/O. J. E. Tinline; W/O. Z. R. Trudeau.

MISSING.—W/O. W. B. Baldwinson; P/O. G. H. Bainbridge; P/O. J. B. Bell; P/O. V. H. Bernyk; Sgt. D. B. Carter; W/O. C. H. Coathup; Flt. Sgt. F. B. Dennis; P/O. W. W. Downer; W/O. R. O. Dwyer; Flt. Lt. G. B. Edmonds; Flt. Sgt. E. W. Eppler; Sgt. S. W. Follows; W/O. E. J. Gares; F/O. E. J. Hagen; Sgt. W. A. Hallett; F/O. W. A. Hughes; W/O. W. K. Johnson; F/O. P. F. Korbyl; Flt. Sgt. E. A. Lansdowne; Flt. Sgt. R. J. Lawrie; Sgt. A. C. Letcher; F/O. D. L. Lewis Watts; P/O. G. W. Lillico; Sgt. R. W. Lowther; Flt. Sgt. T. R. McDennon; P/O. A. M. McGregor; Sgt. I. N. McInnis; Flt. Sgt. J. M. MacLeod; Sgt. J. G. Manson; F/O. A. C. G. Mercer; F/O. F. H. Mills; Sgt. J. Mulligan; Sgt. C. R. Newell; Flt. Sgt. W. J. Olmsted; Sgt. M. J. Petrina; P/O. J. D. Quinn; Sgt. C. W. Rose; W/O. T. M. Ryan; W/O J. L. Stubbs; P/O. W. J. D. Sturmy; W/O. G. H. Taylor; F/O. A. E. Thrasher; Flt. Sgt. H. K. Tole; F/O. B. A. Trewin; Flt. Sgt. D. F. C. Weeks; F/O. J. M. Westlake; Flt. Lt. J. H. Whalen; Flt. Sgt. J. A. Whittaker; Flt. Sgt. T. Zbytniuk.

KILLED ON ACTIVE SERVICE.—W/O. J. A. Brown; Wing Cdr. J. E. Walker, D.F.C.; F/O. W. N. Wiegand.

DIED OF WOUNDS OR INJURIES RECEIVED ON ACTIVE SERVICE.—P/O. H. E. Delhaye.

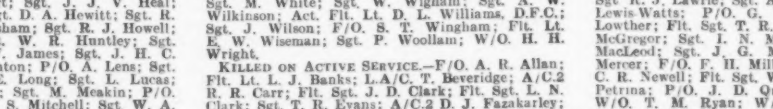
PREVIOUSLY REPORTED MISSING, NOW REPORTED PRISONER OF WAR.—F/O. D. C. E. Bradshaw; F/O. W. C. Drumm; W/O. A. M. Wilson.

Royal New Zealand Air Force

PREVIOUSLY REPORTED MISSING, NOW PRESUMED KILLED IN ACTION.—Flt. Sgt. D. H. W. Babcock.

MISSING.—F/O. H. J. Murray; F/O. G. Fisher.

TRENCH H.Q. : R.A.F. Regiment personnel in the signals and plotting room in an underground trench at a Flight Headquarters somewhere in Normandy.



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